

ANCIENT INDIA

Bulletin of the Archaeological Survey of India

NUMBER 6

JANUARY, 1950

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ANCIENT INDIA

Number 6

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NOTES

In the last number of *Ancient India* we expressed the hope that archaeology would continue to be a Central subject in the new Constitution of India. That hope has only been partially fulfilled, for part of the antiquarian duties on the Centre has now devolved on the units constituting the Union of India, now called States. The Constitution in its seventh schedule, which deals with the distribution of the legislative powers between the Union and the State, has defined the respective spheres of jurisdiction as follows :—

1. Union : 'Ancient and historical monuments and records and archaeological sites and remains, declared by Parliament by law to be of national importance' ; and

2. State : 'Ancient and historical monuments and records other than those declared by Parliament to be of national importance'.

3. Besides these two categories, both the Union and the States will have concurrent jurisdiction over 'archaeological sites and remains other than those declared by Parliament by law to be of national importance'.

* * * * *

It is too early yet to visualize the practical consequences of this allocation of jurisdictions. But the principles are clear : the Central Department of Archaeology will be relieved of the care it had been bestowing, since its inception, on numerous monuments of local significance and will now be free to restrict its activities only to outstanding monuments of national importance. Sooner or later, the States will have to start their own organizations for looking after monuments other than those accepted by Parliament as 'national'.

But this holds good in the case of monuments only ; the position in regard to 'archaeological sites and remains' is somewhat different. Here, while the Centre will remain in exclusive charge of such sites and remains as are considered by Parliament to be of national importance, the residue will not completely devolve on the States but will remain under the concurrent jurisdiction of the Union and of the respective State. The implications are significant, for it means that the Centre will not be absolved of all responsibility in this direction and can assert itself whenever it feels that a State, either through negligence or by following wrong methods or policies of exploration, is acting detrimentally to the sites and remains in its jurisdiction.

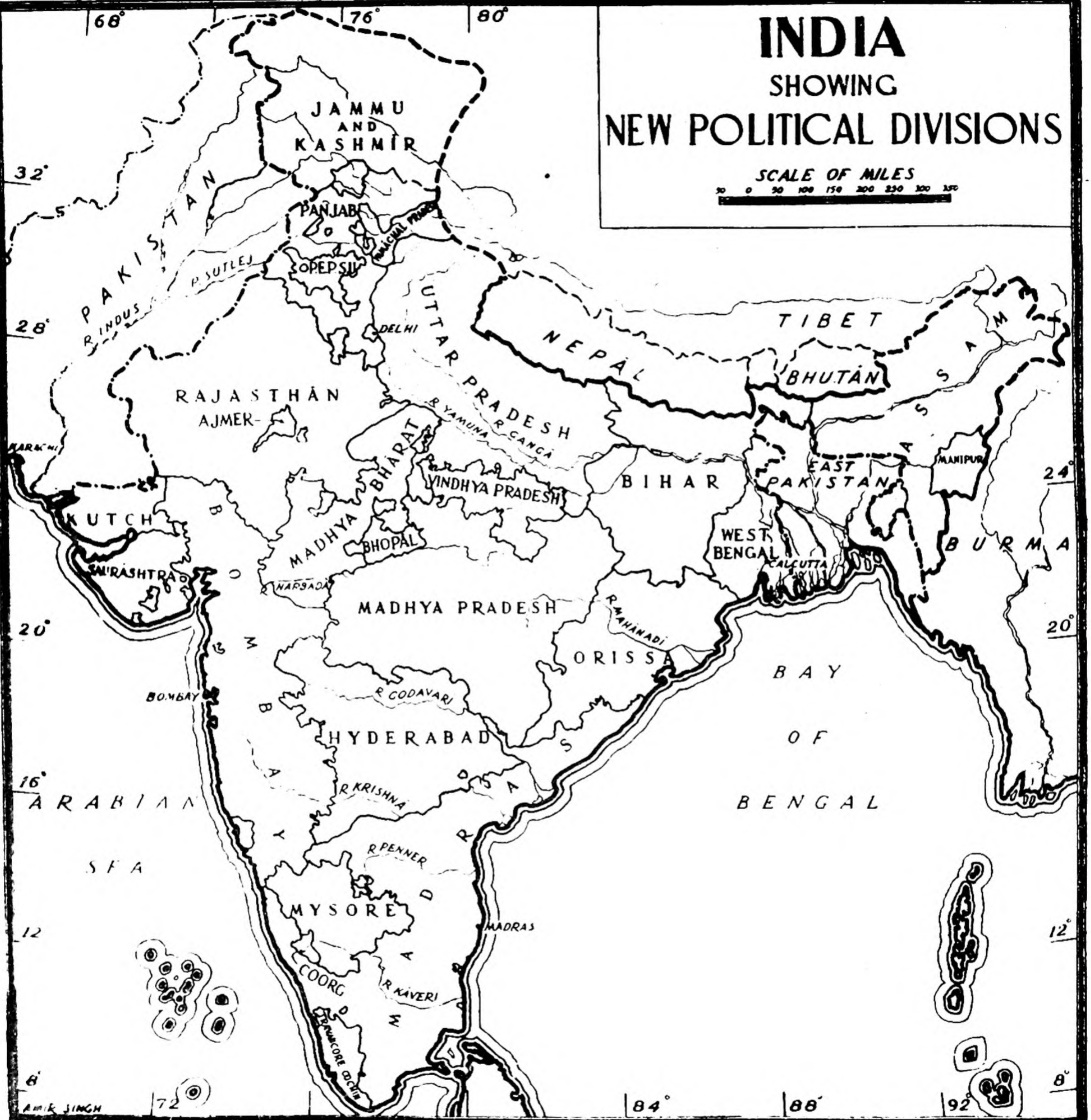
* * * * *

While the taking over by the States of monuments of local importance may mean some relief to the Central Department, it will be more than counterbalanced by its statutory obligation of taking over the monuments of national importance in what were till recently the Indian States and which now exist only as units of the Indian Union, either singly

INDIA

SHOWING NEW POLITICAL DIVISIONS

SCALE OF MILES
0 50 100 150 200 250 300 350



NOTES

(in the case of the larger States) or as formed into unions, not to be speak of those which have merged into the neighbouring States or are now Centrally administered. Both the viable and the united ones are, under the Constitution, undistinguishable from the Provinces in their relationship *inter se* and with the Union Government. Consequently, the Union will take charge of the national monuments situated in these territories as well. The viable and the united States will have to set up their own machinery to deal with their local monuments ; where such machinery already exists, it will have to surrender the ' national ' monuments of the State to the Centre.

* * * * *

The old provinces and the ex-Indian States (united or otherwise) now form the States of the Union of India. The following States represent the old Provinces : Assam, Bihar, Bombay (previously Bombay Presidency), Madhya Pradesh (previously Central Provinces), Madras (previously Madras Presidency), Orissa, Panjab (East Panjab in post-Partition India, to be distinguished from its counterpart, West Panjab in Pakistan), Uttar Pradesh (previously the United Provinces) and West Bengal.

The names of the viable and united States are : Hyderabad, Madhya Bharat (roughly the previous Bundelkhand States of Central India), Mysore, Patiala and East Panjab States Union (PEPSU), Rajasthan (previously the Rajputana States), Saurashtra (consisting of the Gujarat States excluding Baroda which has now merged into Bombay) and Travancore-Cochin.

The third category consists of States administered from the Centre, viz. Ajmer, Bhopal, Bilaspur in Panjab, Cooch-Bihar, Coorg, Delhi, Himachal Pradesh (consisting of the States in the foothills of the Himalayas in eastern Panjab), Kutch, Manipur, Tripura and Vindhya Pradesh (consisting roughly of the Baghelkhand States of Central India).

* * * * *

To revert to the subject of archaeology in New India. Henceforth both the Centre and the States of India will have to share the twin responsibility of preservation and exploration. For good or evil, the monopoly of the Centre has been broken, though it remains to be seen how the States take to their new task. Many States may not be prepared to shoulder the additional responsibility immediately. To them we assure all help : consistent with our own limited resources, we shall be glad to tend to the monuments which are now legitimately their charge ; we shall, again consistent with the limited facilities available, train their archaeologists, so that they can eventually take charge of their responsibility with confidence and credit. To such States as can undertake their antiquarian functions forthwith we offer all co-operation. Given goodwill and mutual understanding, no occasion for conflict of interest between the Union and the States need arise, and it should not be at all difficult to formulate principles and policies and to start healthy conventions which will stimulate archaeological activities throughout India on sound lines.

N. P. C.

THE MICROLITHIC INDUSTRIES OF BOMBAY

By K. R. U. TODD

Elsewhere in this journal (below, p. 64) Colonel D. H. Gordon covers the entire ground of the microlithic industry in India. The following article by Commander K. R. U. Todd reviews one phase of the industry, viz. the one found in Salsette Island, Bombay, which he himself discovered, explored and reported on about twenty years back. It is a matter of deep regret that the death of the author prevented him from clarifying a few terms of uncertain connotation, e.g. 'Iron Age pottery' and 'Early Buddhist pottery', to which his attention had been drawn by the editor.

FROM time to time short accounts of Indian microlithic industries are published in scientific journals. These accounts do not generally analyse the industry nor give detailed accounts of the types of tools, cores and by-products resulting from such industry. It is with this deficiency in view that an attempt is made here to classify the microlithic industry of Salsette Island, north of the city of Bombay. This island lies between the parallels of $19^{\circ}03'$ and $19^{\circ}20'$ North and between the meridians of $72^{\circ}45'$ to $73^{\circ}00'$ East.

NATURE OF THE COUNTRY

Running down the centre of the island is a jungle-covered high ridge of basalt, sloping gradually to the west but steeply to the east. Its shores are indented with tidal creeks fringed with mangrove swamps.

Due to the dip of the basaltic flows, about 10 degrees to the west, the agate-bearing seams in the inter-trappean dykes or amygdaloidal layers are found, eroded by river-action, to the east of the ridge by about 10 to 15 miles.

The flat coastal plains to the west consist of marine deposits from which small outliers of basalt crop up. Microlithic sites are likely to be found wherever these hills or hummocks are adjacent to the coast or the creek.

IMPLEMENT-MATERIAL

On the coastal sites the prevalent material is indurated shale, with pebbles of agate, chalcedony, carnelian and chert used, when available, for the manufacture of microliths. Scrapers and large tools are made of basalt or indurated shale. East of the Salsette hills the predominant material is agate and chalcedony, brought down by the Ulhas river and Thānā creek.

LOCATION OF SITES

In practically every case, settlements are on high ground sparsely covered with trees, generally between 50 and 100 feet above Ordnance Datum. The availability of plantain and coconut on the coastal plain and the abundance of fish and fowl in and close to river and creek might have encouraged the growth of settlements. Jungle-habitation, from negative evidence, seems to have been shunned.

THE TYPE-SITE

Yerangal¹ Point (see map, fig. 1) may be taken as a typical habitation, for it is from here that a comprehensive series of artefacts was obtained, both from the surface and below.

¹ Shown as Erangal on map, fig. 1.

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This settlement is situated on and close to the summit of a small bare hillock, 64 feet in height and with a freshwater spring 100 yards to the eastward. Flanking its western side is a raised beach with a base height of 15 feet above the high water-level.

From this site the following were obtained :—cores, 132 ; core-rejuvenation flakes, 18 ; microliths, 151 (in addition to 23 fragmentary ones) ; scrapers, 54 ; burins, 16 ; maces, 3 ; axe-form, 1 ; and wedge-choppers, 2.

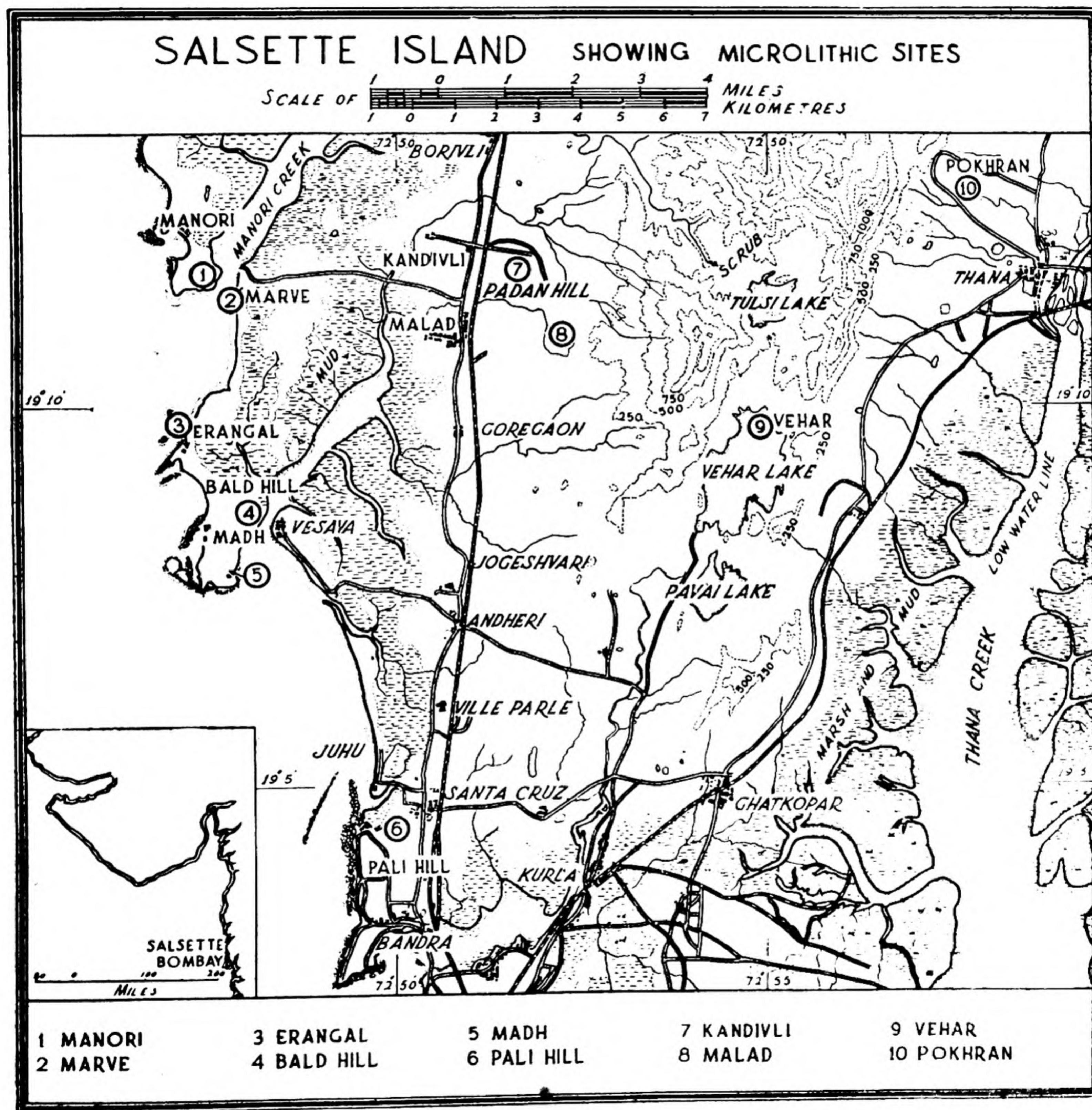


FIG. 1

An analysis of the types is given below :

<i>Shapes</i>		<i>Microliths</i>		<i>No.</i>	<i>Percentage</i>
Obliquely blunted	...	...	...	37	24·5
Whole-side blunted	...	...	...	26	17·2
Lunates	...	...	...	46	30·5
Triangles	...	...	...	16	10·6
Trapezes	...	...	...	5	3·3
Trapezoids	...	...	...	7	4·6
Drills	...	...	...	14	9·3
Total		...	...	151	100·0
		<i>Cores</i>			
Single platform	...	...	...	78	59·1
Double platform (top and bottom)	...	...	...	25	18·9
Double platform (right angles)	...	...	...	19	14·4
Treble platform	...	...	...	3	2·3
Indeterminate	...	...	...	7	5·3
Total		...	...	132	100·0
		<i>Scrapers</i>			
Convex	...	...	...	31	57·4
End	...	...	...	12	22·2
Hollow	...	...	...	4	7·4
Hollow and end	...	...	...	4	7·4
Indeterminate	...	...	...	3	5·5
Total		...	...	54	100·0

The core-rejuvenation flakes are subdivided as follows :—Across the toe (batter-back), 12 ; across the base (discoïd), 3 ; up the face (plunging), 2 ; and across the face, 1.

Burins : consisting of single blow, 5 ; polyhedral, 6 ; bec de flute, 4 ; and angle, 1.

Needles or *drills* are of round, rectangular and triangular section, the latter prevailing. They average 9 p.c. of microliths from all sites and may have been hafted in birdbones or bamboo.

Micro-burins : there is one possible micro-burin. Another, from Bald Hill, Varsova, was submitted to Dr. J. G. D. Clark and is considered by him to be the second specimen. There are three other specimens, from Yerangal, made by a vertical blow on the dorsal surface instead of by the classical method.

Associated with the microlithic tools, on coastal sites, is a medium to heavy type of implement (see fig. 5, 95-97,) which may have been used for removing oysters and limpets from rocks or for chopping. This type is a *wedge-shaped chopper* and has been found at Pāli Hill and Bald Hill as well as at Yerangal. It is made of indurated shale or quartzite.

One *axe-like* form was obtained from Yerangal and another from Manori Point.

Mace-heads or *digging stones* were found only at Yerangal, a complete one from the surface of an eroded patch, while two fragments were dug out of the side of a small wash-out at a depth of 6 inches. These maces have hour-glass perforation and are made of basalt.

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OTHER SITES .

At Manori Point, Marve¹ and Bald Hill, microliths are plentiful and are of the same types as at Yerangal. The average percentage of trapezes is 7·3, which is close to that of Yerangal if trapezes and trapezoids are counted together. Similar industries are found at Madh Fort and Pokhrān, the latter a lacustrine site 2 miles north-west of Thānā. At Pāli Hill, too, there was a settlement but most of the site has been destroyed by quarrying. Khandivli² and Malād as well yield traces of the industry. Burins are met on all sites, 14 having been obtained from Manori Point and 12 from Bald Hill.

Sites on river-banks are characterized by the use of agate and similar material ; this is most in evidence from the Ambā river³, south of Bombay (not included in the map).

It is noticeable on all sites that a large quantity of small untrimmed flakes was made from fluted cores. These may have been intended for use in composite tools such as sickles, or for harpoon-barbs, though for the latter purpose other methods, mentioned below, may have been used. The microliths and associated flakes vary between 18 and 25 mm. in length. It is probable that this is due to the size of the available raw material.

METHODS OF MANUFACTURE

The core was prepared by free flaking, thereafter by the controlled and pressure methods. Semi-precious stone was preferred for microliths, indurated shale being used for coarser tools. Microliths have steep side blunting, generally from the ventral surface, occasionally from the dorsal as well. Bulbs of percussion were removed by chipping.

BEADS

Beads were found on certain sites, on or below surface. While the surface-finds are not claimed as contemporary, they may indicate the latest period for dating.

A fine barrel-shaped banded agate specimen, drilled from either end, was obtained from Pāli Hill, while Manori Point and the Ambā river yielded carnelian examples. An unfinished spherical carnelian bead came from Bald Hill. At Yerangal and Pokhrān broken green vitreous beads were obtained.

Hog Island,⁴ in Bombay harbour, yielded one octagonal bead of jadeite, two spherical ones, one of chert and the other of agate, and an unfinished barrel-shaped one of chalcedony. One of the spherical beads was an early type of 'eye-bead'. A barrel-shaped terracotta specimen came from a small site on the north-west bank of Vihar Lake.

A triangular fragment of coral, with a retouched natural hole in the centre, was found at the Madh Fort site and may have been used as a spacer or for securing the end of a necklace. A circular disc of unperforated agate, together with a polished fragment of flat agate with a diameter of about 3 inches, was found at Yerangal.

Beads were found associated with microliths at Langhnāj (North Gujarat, Bombay State)⁵, which also yielded bone-pieces, claimed to be implements.

¹ K. R. U. Todd in *Journal of Royal Anthropological Institute of Great Britain and Ireland*, LXIX (1939), p. 70.

² Shown as Kandivli on map, fig. 1.

³ K. R. U. Todd in *Proceedings of the Prehistoric Society of East Anglia*, VII (Ipswich, 1932), p. 42.

⁴ *Ibid.*, p. 41.

⁵ H. D. Sankalia, *Investigations into Prehistoric Archaeology of Gujarat* (Baroda, 1946).

POTTERY

Pottery was obtained at Marve but it might have been intrusive.

At Pokhrān the microlithic layer had been cut through by a cremation-hole for a barrow, which contained a globular urn of Iron Age.

On Padan Hill at Khandivli, the microlithic horizon is overlaid by a sterile layer of black sand which, in its turn is capped by a pottery-layer of Early Buddhist age. A small bas-relief of a deity was excavated from this layer.

ROCK-ENGRAVINGS

Rock-engravings of conventional designs are associated with microliths at Malād and Khandivli, the former on a boulder now in possession of the Ipswich Corporation Museum, and the latter on the face of a small rock-shelter on Padan Hill backing the Early Buddhist site which contained the bas-relief.

OTHER PROBABLE IMPLEMENTS

No traces of bone or wooden tools were discovered but there is a possibility that cat-fish pectoral bones, common in the creeks and along the coast, were used as leister-prongs as they would prove most suitable for the purpose.

Bamboo, shaped and hardened by fire, would make excellent lances, knives or needles.

NAVIGATION

The Bombay area yields no traces of wood-craft. The fact that the majority of the microlithic sites are marine sites would appear to argue that the possession of some means of crossing small stretches of water was a necessity. At Vengurla Rocks, about 150 miles south of Bombay and separated from the mainland by more than a mile, there is a small microlithic site close to the lighthouse. The intervening stretch of water has a maximum depth of 25 feet at low water, indicating the necessity of some form of craft to enable access to the island.

AFFINITIES

Affinities of the microlithic industry described here with those in other parts of India are hard to determine due to paucity of work or collection of special types only. The Sturge collection in the British Museum is valueless from the point of view of correlation as it is merely a collection of lunates and associated forms, and is only labelled 'India'. Their appearance indicates a Bundelkhand-Baghelkhand origin.

Gordon¹ has published a list of microlithic sites in India but does not appear to have analysed the industries found by him. No associated heavy tool-types are mentioned by him, probably because they were not present on the sites discovered by him. His statement that the size of implements is largely dependent on the available raw material is, I think, undoubtedly true. It is noticeable that among the catalogued sites, only one area, viz. central India, yields trapezes, and here too they are 'very rare'.

¹ D. H. Gordon in *Man*, February 1938, no. 19.

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Sankalia states that trapezes were present at Langhnāj, and Hirpurā but from examination of his illustrations I should say this is doubtful. In addition, he says that there was little or no secondary chipping except sometimes on lunates and small disc-like pieces. The majority are simply primary flakes. He also states that there was no genuine burin.¹ The presence of burins, trapezes and a heavy equipment consisting of maces, axes and choppers would appear to point to influences from northern India.

The discovery of one each of undoubted micro-burins from Bald Hill and Yerangal, and of three, from the latter place, made by vertical blows on the dorsal surface (above, p. 6), is of great interest. So far as I am aware, micro- and pseudo-micro-burins have not, as yet, been recorded from India. The method of manufacture by a vertical blow on dorsal or ventral surface has been observed by Dorothy Garrod in specimens from Mugharet el Wad in Palestine, where they occur, in association with those made by the classical method, from the upper layers of the Lower Natufian to the whole of the Upper Natufian.² The Salsette micro-burins would therefore appear to be derived from peripheral influence from Palestine, and it is to Kāthiāwād and West Pakistan that we must look for further evidence of the type. The nomenclature 'pygmy' may be due to the failure of field-workers to note the presence of heavy tools in the microlithic sites of central and southern India, though Paterson found them in northern India.³

In Pāli Hill was found a greyish green backed blade of indurated shale bearing no resemblance to any other blades from Bombay but similar to those of cherty flint from Rohri in Sind.

AGE OF THE MICROLITHIC INDUSTRY

The fact that Early Buddhist and Iron Age pottery overlies the microlithic deposits, as noted at Khandivli and Pokhrān respectively, indicates that the stone industry can be dated prior to those periods. The bas-relief at Khandivli has been tentatively dated to 200 B.C., while the early Iron Age pottery is of an earlier date.

CONCLUSION

The microlithic industries of Bombay consist of lunates, triangles, trapezes, obliquely and straight side blunted microliths produced with single blow, polyhedral and bec de flute burins as well as drills. Cores of single and double platform types predominate. Scrapers are of usual form including hollow types. Associated is a heavy industry in which wedge-shaped choppers are found together with a mace- and axe-element. Beads are sometimes present.

The industry may be dated prior to 200 B.C., probably 500 B.C. but subsequent to the blade and burin horizon found at Khandivli, located on the surface of the upper gravel.

The affinities with the Indus valley are shown by the wedge-choppers, barrel-beads, as also by the prevalence of burins. Burins decrease in number in the southerly regions, pointing to their northern origin.

A further link with the north is provided by the presence of trapezes and trapezoids which are common in Karachi. Their presence in the microlithic industries becomes

¹ H. D. Sankalia, *op. cit.*

² D. A. E. Garrod and D. M. Bate, *The Stone Age of Mount Carmel*, I (Oxford, 1937), pp. 31-34.

³ K. R. U. Todd in *Man*, March 1948, no. 27.

more and more limited the farther south we proceed. Sankalia's Gujarat expedition yielded no burins and few, if any, trapezes. The area covered by the expedition is well east of the Kāthiāwād coast and was perhaps not anciently affected by a coastal migration, which can be postulated by the concentration of these lithic sites in riverine and coastal areas, viz. the Indus valley, Kāthiāwād coast, Narmadā valley and North Konkan coast of Bombay. The migration may have been of a people similar in habits to the 'strandloopers' of South Africa.¹

It may be that the earlier microlithic industries of North and West India will be found to contain trapezes and burins with origins in the Iraq-Iran area via the Makrān and Baluchistan coasts. The heavy element of choppers, with an axe and mace-head complex, may be derived from the Bugti Hills and Indus valley.

The series of lunates and triangles without burins and trapezes may be late Microlithic, contemporary in certain areas with the Neolithic and, in out of the way places, extending to the fifth or sixth century A.D.

DESCRIPTION OF IMPLEMENTS (FIGS. 2 TO 6)

- Mace-heads.** Fig. 2, 1 and 2 illustrate a complete and a broken half specimen respectively. These, and a further fragment showing incomplete hour-glass perforation, were obtained from Yerangal. All are made of basalt.
- Axes** are depicted in fig. 2, 3 and fig. 6, 98, the former from Yerangal and the latter from Manori Point. Both are of indurated shale.
- Cores.** Four forms are depicted as follows : single platform by fig. 2, 4 to 6, double platform on the same axis by fig. 2, 7, with a variant of right-angle platform by fig. 2, 9. Fig. 2, 8 is a three-platform core. Small cores are generally of agate, chalcedony and carnelian, while the larger specimens are of indurated shale or chert.
- Lunates** are made of agate, chert and chalcedony. Types from Yerangal are illustrated by fig. 3, 10 to 21. Other sites are Bald Hill, fig. 6, 105 to 107, Manori Point, fig. 6, 108 to 110 and Pokhrān, fig. 6, 111 and 112. Some lunates have the curved back blunted from both faces of the tool after the Heluan style (also found in Palestine).
- Blunted backs** consist of two forms : those with blunting at an oblique angle to the axis and those with blunting down the whole of one side. Fig. 3, 22 to 29, from Yerangal, are in the former category as are fig. 6, 113 from Marve, fig. 6, 114 from Manori and fig. 6, 115 and 116 from Bald Hill. Fig. 3, 30 to 37, from Yerangal, are of the second category, while fig. 6, 121 is a fine example from Pāli Hill. Fig. 6, 122 is from the Ambā river, south of Bombay, and is made of translucent chalcedony. These two should be compared with fig. 3, 30 of pink chert, and fig. 3, 37 of speckled chalcedony.
- Triangles** of agate and chalcedony from Yerangal are featured in fig. 3, 38 to 43. Similar tools from Bald Hill, Manori and Pokhrān are figured in fig. 6, 123 to 125, 126 and 127 and 128 respectively.
- Trapezes and trapezoids** from Yerangal are shown by fig. 3, 44 to 47. Fig. 6, 117 and 118 are from Bald Hill, fig. 6, 119 from Marve and fig. 6, 120 from Manori. This form, together with the burin, is one of the salient features of the coastal microlithic industry of Bombay.
- Drills** are illustrated in fig. 3, 48 to 51 and fig. 6, 129 to 132. The former are from Yerangal, while fig. 6, 129 and 130 are from Bald Hill, and the remaining ones (fig. 6, 131 and 132) are from Manori.
- Other microliths.** Fig. 3, 52 is an awl, and fig. 3, 53 and 54 rhomboids. These two types are rare. All are from Yerangal.

¹ M. C. Burkitt, *South Africa's Past in Stone and Paint* (Cambridge, 1928).

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Burins from Yerangal are shown in fig. 3, 55 to 57 ; fig. 6, 99 and 102 are from Manori, fig. 6, 101 from Marve and fig. 6, 100, 103 and 104 from Bald Hill. The larger types are made of indurated shale or chert, and the smaller ones of agate.

Scrapers are of various forms and are illustrated in fig. 4, 61 to 72; 61 and 62 are core scrapers, 63 and 64 of button type, the latter being of crystal. Hollow types are shown in fig. 4, 71 and 72, the former being a composite end and hollow one.

Core-rejuvenation flakes. Fig. 4, 73 is a flake from a double platform core with platforms at right angles. This has caused it to be partly across the face and partly up the face. It is, in fact, a plunging flake having these two characteristics. Fig. 4, 74 is a batterback (across the toe), 75 is a discoid (across the base), and 76 is across the face.

Micro-burins. Fig. 4, 77 from Yerangal and 78 from Bald Hill are true micro-burins. Fig. 4, 79 to 81, also from Yerangal, are made by the vertical blow on dorsal or ventral surface, 79 being a miss-hit.

Beads are shown in fig. 4, 82 and 84 to 94 and are from various sites. Fig. 4, 82 is an unperforated disc of agate from Yerangal ; 88 an incomplete carnelian spheroid from Bald Hill ; 90, barrel, from a small site north-east of Vehar Lake ; 91, of jadeite, from Hog island ; 92, an eye-bead, from the same site. Fig. 4, 84 and 85 are green vitreous beads, the former from Yerangal. Fig. 4, 87 is from Manori, 86 from the Ambā river and 89 from Pāli Hill. Fig. 4, 83 is a fragment of polished flat agate.

Wedge-choppers are illustrated in fig. 4, 95 to 97, respectively from Yerangal, Bald Hill and Pāli Hill.

Utilized flakes. These are found on all sites, some with a small amount of secondary chipping, others with no signs of use other than the removal of small 'squills' due to wear. These tools should not be confused with the small untrimmed microlithic flakes which may have been used in composite tools as mentioned earlier. Fig. 3, 58 to 60, all from Yerangal, show types of utilized flakes.

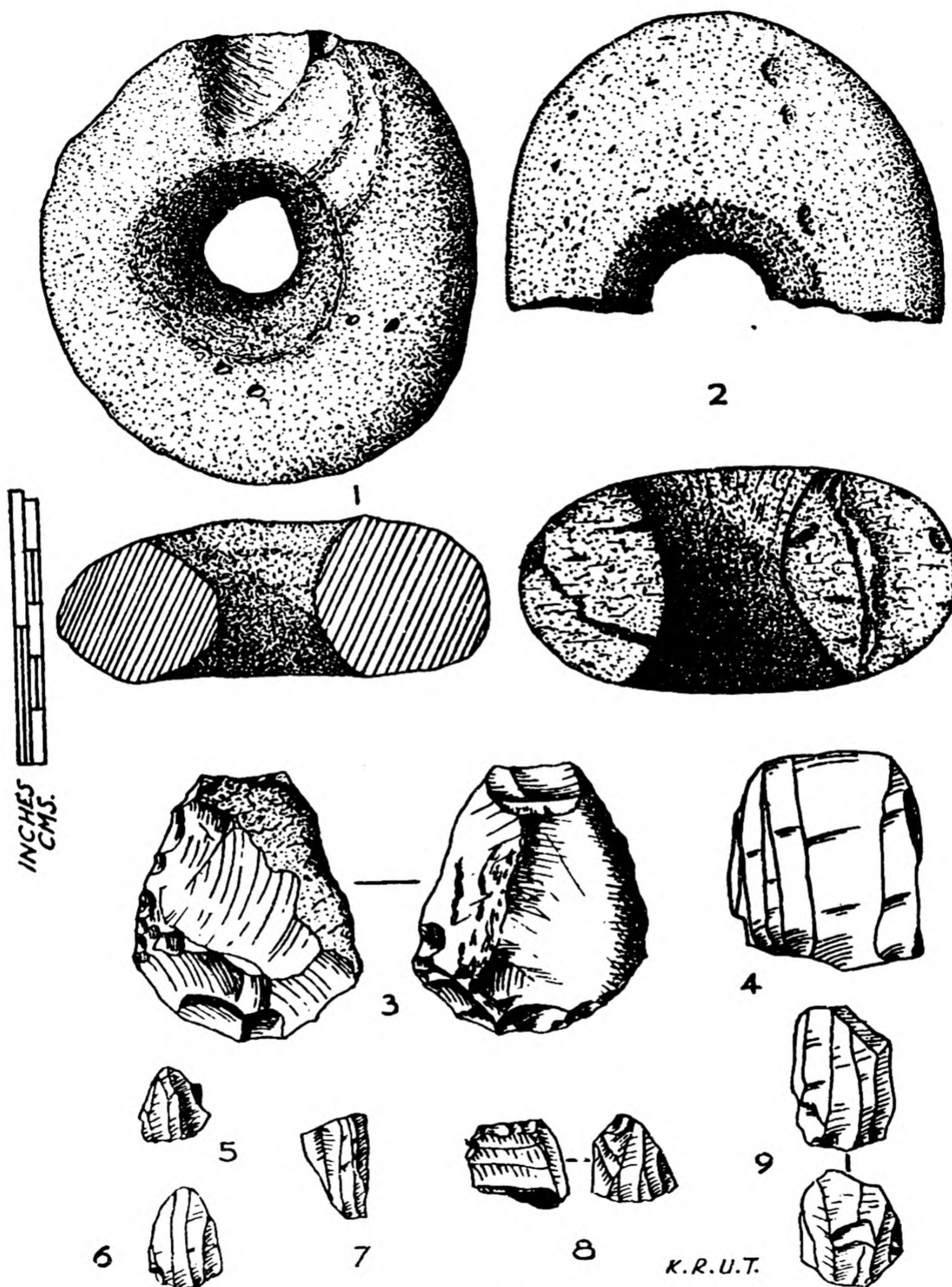


FIG. 2. 1, 2, mace-heads ; 3, axe ; 4-9, cores—all from Yerangal

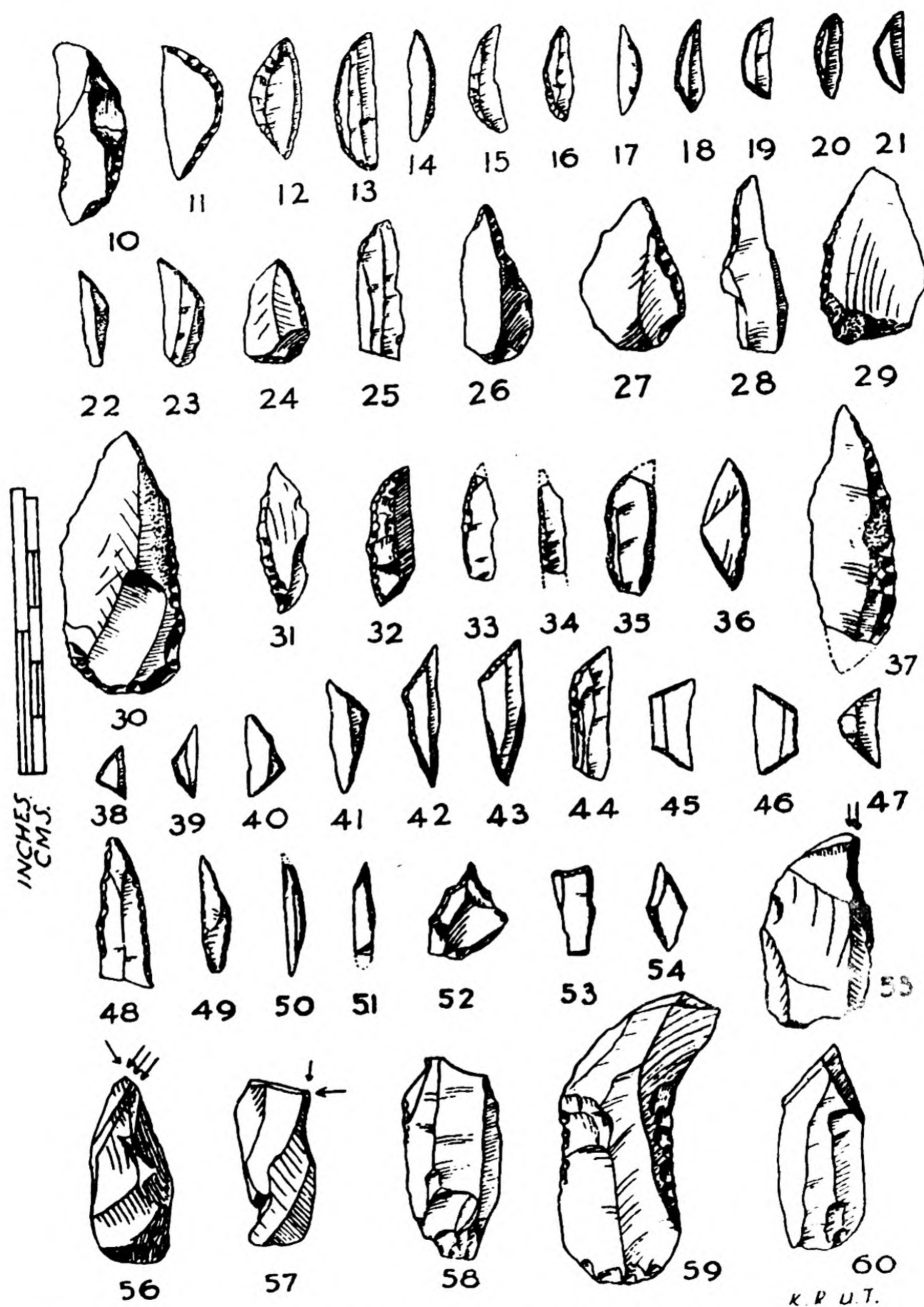


FIG. 3. 10-21, lunates ; 22-37, blunted backs ; 38-43, triangles ; 44-47, trapezes and trapezoids ; 48-51, drills ; 52, awl ; 53-54, rhomboids ; 55-57, burins ; 58-60, utilized flakes—all from Yerangal

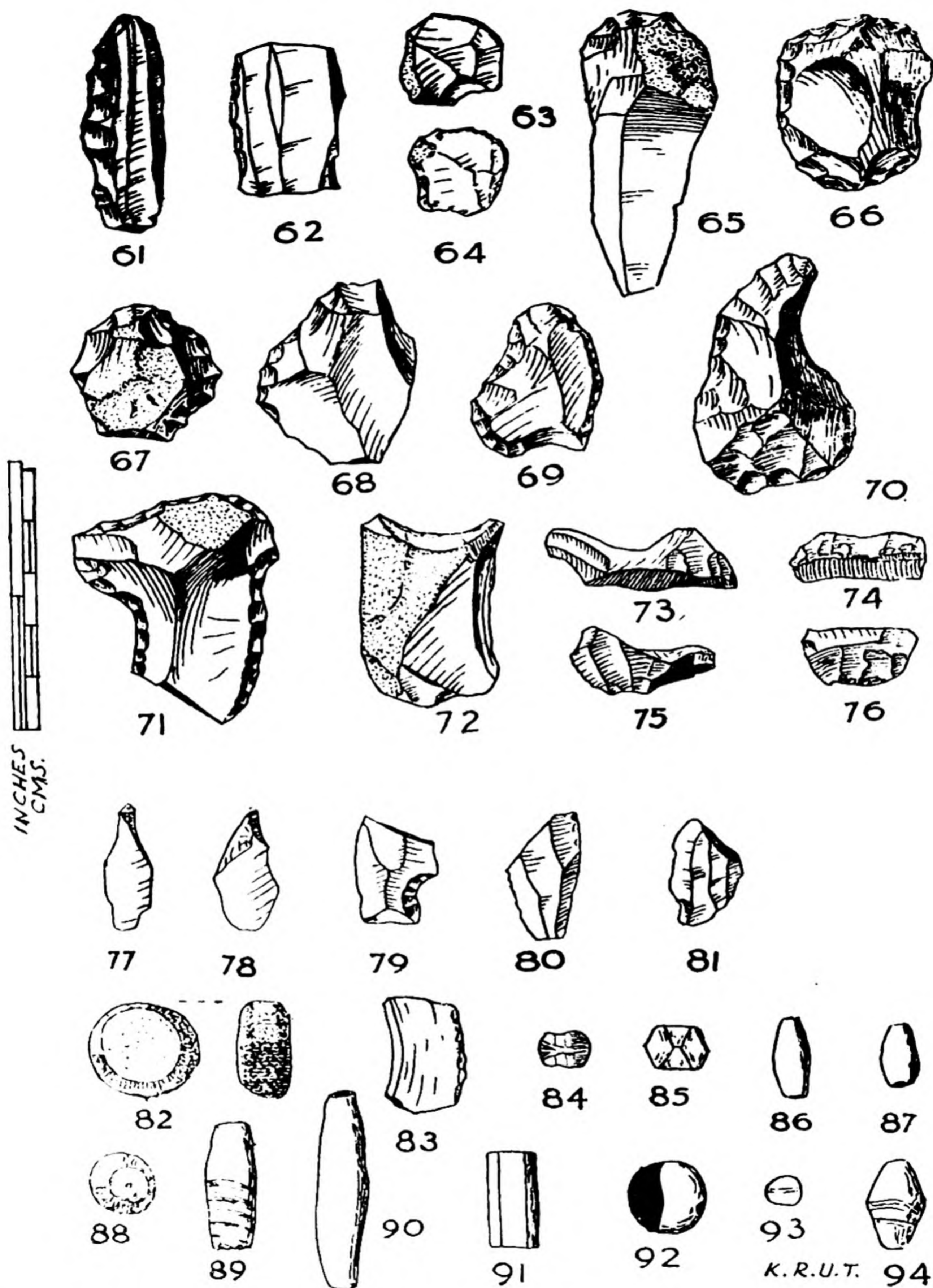


FIG. 4. 61-72, scrapers ; 73-76, core-rejuvenation flakes ; 77, 79-81, micro-burins from Yerangal,; 78, same from Bald Hill ; 82, 84-94, beads from various sites ; 83, fragment of polished flat agate

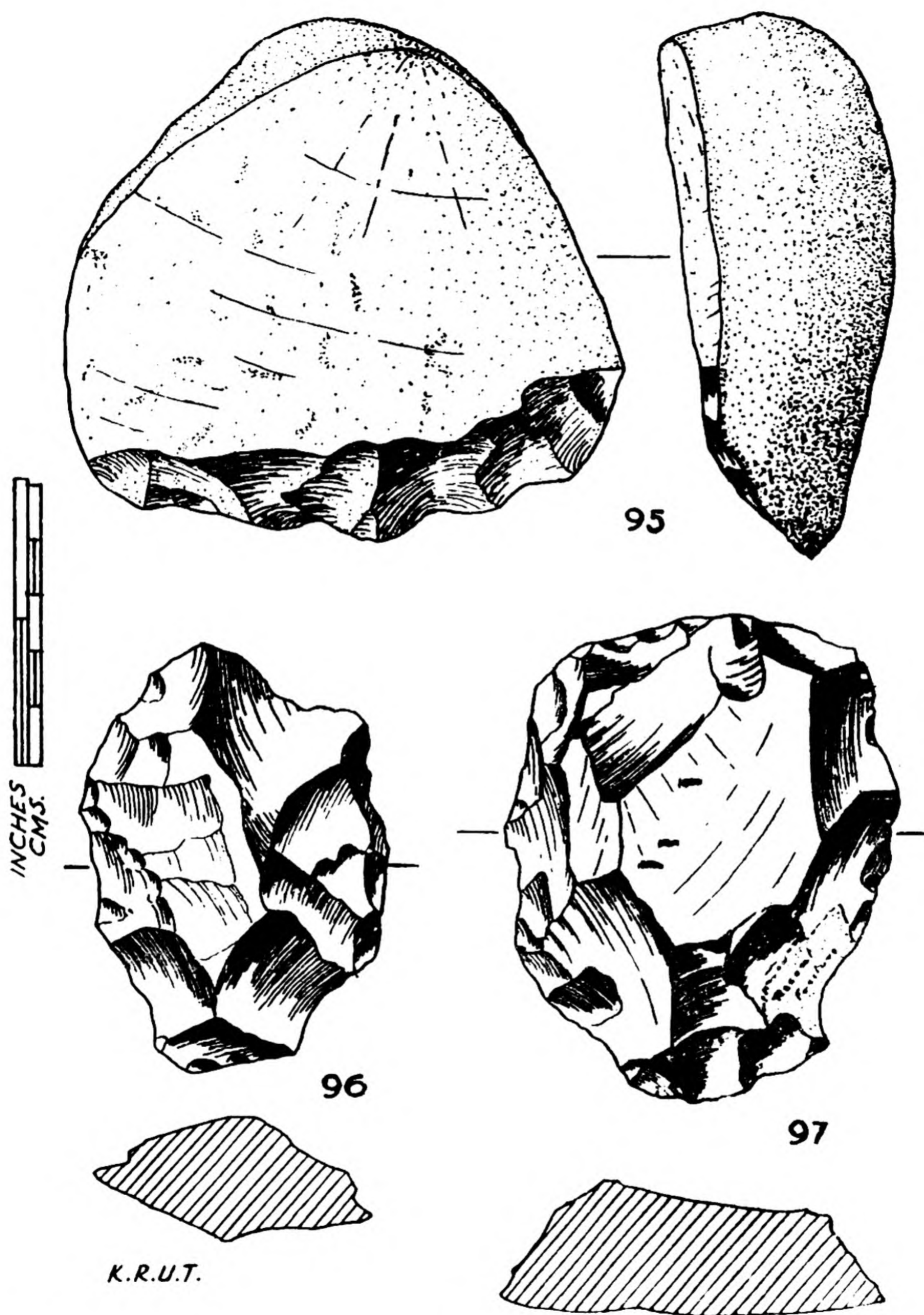


FIG. 5. 95-97, wedge-choppers, respectively from Yerangal, Bald Hill and Pāli Hill

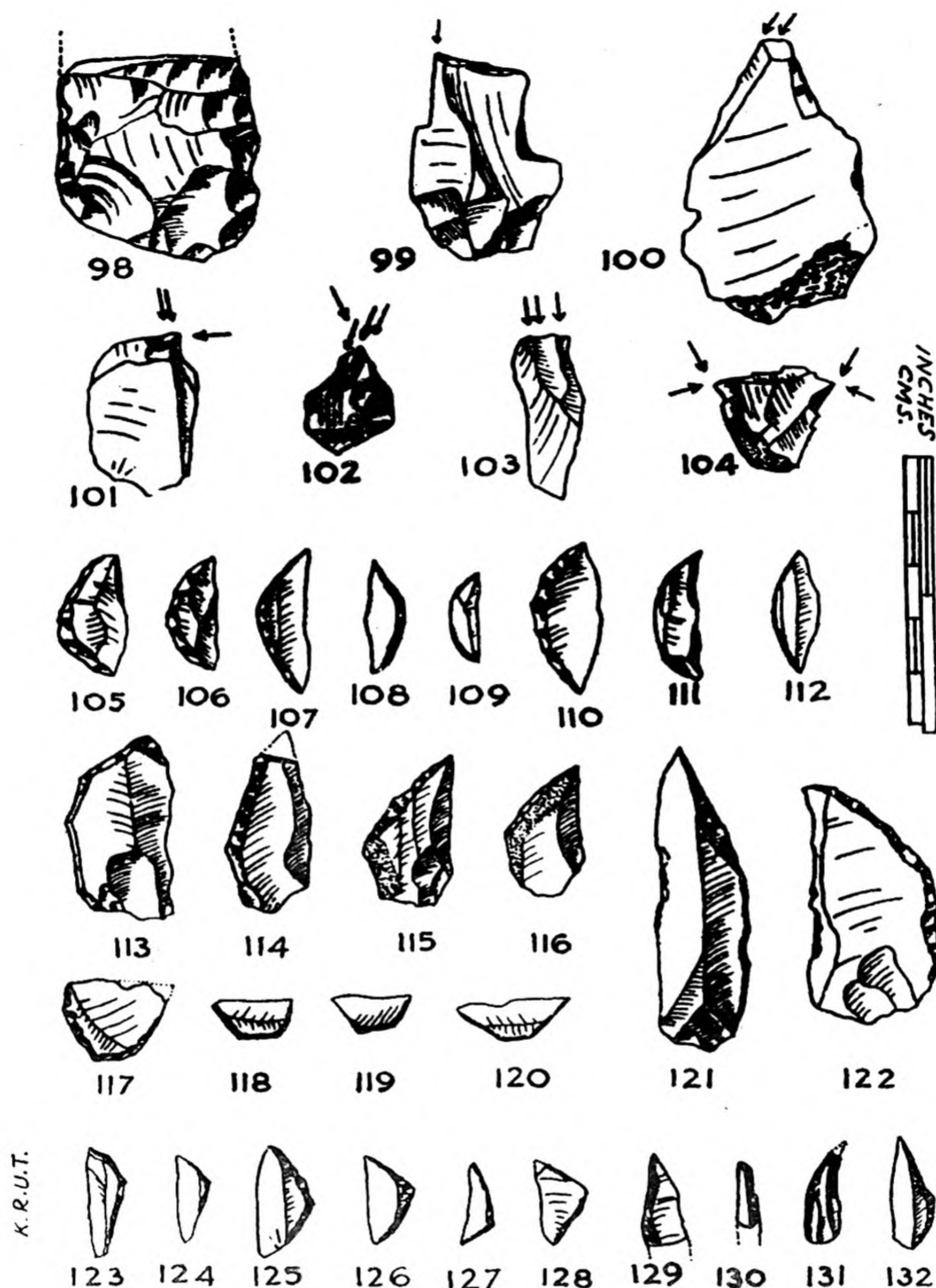


FIG. 6. 98, axe from Manori ; 99, 102, burins from Manori ; 100, 103, 104, same from Bald Hill ; 101, same from Marve ; 105-107, lunates from Bald Hill ; 108-110, same from Manori ; 111 and 112, same from Pokhrān ; 113, blunted backs from Marve ; 114, same from Manori ; 115, 116, same from Bald Hill ; 117, 118, trapezoid and trapeze from Bald Hill ; 119, trapeze from Marve ; 120, same from Manori ; 121, blunted back from Pāli Hill ; 122, same from Ambā river ; 122-125, triangles from Bald Hill ; 126, 127, same from Manori ; 128, same from Pokhrān ; 129, 130, drills from Bald Hill ; 131, 132, same from Manori

RE-EXAMINATION OF A WOODEN POST FROM KIRĀRI, MADHYA PRADESH

By S. S. GHOSH

In this article Mr. S. S. Ghosh, Assistant Wood Technologist, Forest Research Institute, Dehra Dun, re-examines an ancient wooden post found about thirty years back and shows that it is unlikely to have been a sacrificial pillar, as it is generally taken to be, as the wood is not mentioned as suitable for the purpose in Vedic and later literature.

1. INTRODUCTION

IN 1921, a wooden post measuring 13 feet 9 inches was accidentally discovered by the local people in the bed of an old tank near the village of Kirāri in District Bilāspur, Madhya Pradesh. The pillar was carelessly left in the sun till the signs of letters were noticed on it. The village pāndit, though unable to decipher the letters, made an eye-copy of the inscription. The pillar then came to the notice of Sir John Marshall, who had it removed to the Government Museum, Nagpur, where it is still housed.

From an archaeological point of view this was an important find: Dr. Hirananda Sastri¹, who made a careful palaeographic study of the inscription, assigned the pillar to the second century A.D. He also gave the name of the wood of the post as *Pterocarpus marsupium* (*Leguminosae*), locally known as *bījāsāl*.

In 1947, Dr. N. P. Chakravarti, Director General of Archaeology, arranged to send a small portion of the pillar to Dr. K. A. Chowdhury, Wood Technologist, Forest Research Institute, Dehra Dun, for re-examination, with the view of finding out whether the timber was actually one of those specified in the Brāhmanical texts as suitable for sacrificial posts. The material was handed over to the author for investigation by Dr. Chowdhury.

2. RESULTS OF ANATOMICAL INVESTIGATION

The superficial appearance of the wood is rather dark, but there may have been discolouration due to its burial in mud for centuries. After cleaning the exposed surface has shown two fairly distinct zones—the outer dirty brown, and the inner dull red with a brownish tinge. This colour-differentiation gives the impression of sapwood and heartwood. But this has not been confirmed by microscopic examination. The entire wood-block has been found to be a true heartwood. The difference in colour appears to be due to the leaching out of the colouring substances from the outer portion. The wood is fairly close-grained and fine-textured. The outer surface is rough due to the peeling off of wood at places (pl. I, 1). The inner portion is sound and is very hard, weighing about 60 lb. per cubic foot at 12 per cent moisture-content. It is a true *diffuse-porous wood*. The *growth rings* are somewhat distinct to the naked eye (pl. I, 1), and the growth marks are characterized by dark bands of fibres. The rate of growth is about 9 rings per inch. *Pores or vessels* are visible to the eye, small to moderate-sized, usually in radial pairs of 2-5, the pore-pairs often forming radial to obliquely-radial pore-chains (pl. I, 2). *Tyloses* are present, filling up the pore cavities either partially or completely. *Tracheids*

¹ *Epigraphica Indica*, XVIII (1925-26), pp. 152-57.

are few and localized round the vessels. *Soft tissues* or parenchyma cells are clearly seen under a lens. They are usually diffuse, occasionally also in fine lines, forming an irregular reticulum with the rays and pores (pl. I, 2, 4 and 5). *Fibres* are very narrow, visible only under the microscope. They are frequently aligned in the radial direction (pl. I, 5) and appear to be distinctly smaller in cross-section than the parenchyma cells. *Rays* are fine, closely spaced and show as inconspicuous ray-flecks on the radial surface. They are 1-4 seriate and heterogeneous. Two types of rays are recognizable : (1) uniseriate with high cells and (2) multiseriate with horizontal cells in the centre and upright cells at both ends (pl. I, 3). Occasionally both types link up forming very deep rays. Gummy infiltrations are met with in the rays and parenchyma cells.

3. IDENTIFICATION

The outstanding anatomical features of the wood are that the vessels are arranged in radial to obliquely-radial chains, and the parenchyma cells form reticulum with the rays. Moreover, the fibres are very thick-walled and well-packed in radial rows, revealing a dense nature of the wood. All these anatomical characters indicate its affinity to the woods of the family *Sapotaceae* and *Ebenaceae*.¹ Among these two families, it shows more affinity with the former than with the latter. On checking up with all the timbers of the family *Sapotaceae*, it has been found that the wood under investigation resembles the wood of *Madhuca latifolia* (Syn. *Bassia latifolia*) in all the minute anatomical details. This timber is known to the trade as *mahuā*, locally known in Madhya Pradesh as *Mohwā*, *Moh*, *moho*. It will, therefore, be seen that the previous identification with *bījāsāl* (*Pterocarpus marsupium*) was wrong. It is quite possible that the main basis for the first identification was the colour, which is somewhat similar in *Pterocarpus marsupium* and *Madhuca latifolia*.

4. DISCUSSION

A. Effect of submersion of the wood in mud

The specimen is no doubt of considerable interest to the archaeologist, but not less so to the wood technologist, for it gives an opportunity of seeing the results of long submersion of wood in mud.

It may be recalled that the outer portion of the pillar flaked off when it was removed from the tank and left in the sun. The specimen received in this laboratory shows only the heartwood. It is, therefore, not possible to say whether the peeled-off portion was sapwood or heartwood. Again, the specimen shows light colour on the periphery and deep colour in the centre. This naturally gives an impression that the outer portion has been attacked by some fungus. But this is not true. No fungal hyphae has been observed in any portion of the wood. Further, the microscopic examination shows that in the outer portion of the specimen the fibres have undergone considerable changes. The secondary walls, which are normally thick-walled and lignified, have dissolved away, and the fibres have collapsed and shrunk into an irregular mass (pl. I, 6 and 7). On the other hand, the thin-walled parenchyma cells and the rays have somehow retained their original shape and are easily recognizable. Furthermore, the inner portion of the specimen has not shown any change in cell-structure, and this observation has been confirmed by determining the weight of the wood which was found to be about 60 lb. per cubic foot at 12 per cent

¹ J. S. Gamble, *A Manual of Indian Timbers* (London, 1922) ; R. S. Pearson and H. P. Brown, *Commercial Timbers of India*, II (Calcutta, 1932).

RE-EXAMINATION OF A WOODEN POST FROM KIRARI

moisture-content. It may be noted that in the majority of cases examined in our laboratory¹ where specimens were submerged in mud for a long time, the parenchyma cells and the rays have been noticed to be better preserved than the fibres. Chemists² working on ancient woods have reported an apparent increase in the total lignin-content in these timbers. Moreover, an analysis³ of different tissues in a wood has revealed a high lignin content in rays and parenchyma cells in comparison with the fibres and vessels. It is, therefore, quite probable that a high lignin content of rays and parenchyma cells is responsible for the better preservation of these tissues in a submerged piece of wood. However, it is not very clear at present whether there exists any relation between the minute anatomical structure (pits and wall-thickness) of the rays and parenchyma cells and their better preservation in a submerged timber. Further research work on this line may throw some light on this problem.

B. Mention of *Madhuca latifolia* in ancient literature

References to this tree are not wanting in ancient Indian literature. Many virtues have been attributed to *madhūka* tree and its products. In the *Upavana-vinoda*,⁴ under the section *Tarumahimā* ('glory of trees'), it is said that 'he who plants a *madhūka* tree becomes free from all diseases, and by him all the gods, especially the goddess Pārvatī, is pleased and gratified'. Again, in the section *Vichitra-karaṇa* ('botanical marvels') it is stated that if *yashṭimadhu*, sugar, *kushṭha* and flowers of *madhūka* are pasted together and applied to the root of a tree, it produces fruits without seeds within. Furthermore, according to the *Bṛhatsamhitā*,⁵ *madhūka* tree near an anthill is an indicator of underground water in a dry region, and in the *Matsya Purāṇa*⁶ it is mentioned as one of the auspicious timber trees. Use of *madhūka* flowers for the preparation of liquors is also frequently met with. *Suśruta*,⁷ in his list of wines which are appetizing and acid in taste, mentions *śidhu*—a kind of wine prepared from *madhūka* flowers. And Charaka,⁸ in his nine sources of wine, mentions flower-wine (*pushpāsava*) prepared from the flowers of *madhūka* trees. In the *Śabdakalpadruma*⁹ mention is made of *madhūka* (honey-liquor) as one of the twelve different kinds of liquor, apart from the *soma* drink. It also appears that use of perfume and scent was not unknown in ancient times. In the *Mahābhārata*¹⁰ the use of a perfume called *madhura* prepared from *madhūka* and other flowers is referred to. A remarkable effect of using tooth-brush of *madhūka* tree is given in the *Bṛhatsamhitā*:¹¹ one is supposed to get a large number of children if he cleanses the teeth with a twig of a *madhūka* tree.

¹ K. A. Chowdhury, 'Studies on ancient woods', *Report of Seventh International Botanical Congress* (Stockholm, 1950).

² L. E. Wise, *Wood Chemistry* (New York, 1946).

³ W. M. Harlow and L. E. Wise, 'Analysis of wood rays in two hard woods', *Industrial and Engineering Chemistry*, XX, no. 7, p. 720.

⁴ *Upavana-vinoda*, English translation by G. P. Majumdar (Calcutta, 1936).

⁵ G. P. Majumdar, *Vanaspāti* (Calcutta, 1927).

⁶ G. P. Majumdar, *Some aspects of Indian Civilization* (Calcutta, 1938).

⁷ *Ibid.*, pp. 48.

⁸ *Ibid.*, pp. 50.

⁹ *Ibid.*, pp. 55-56.

¹⁰ *Ibid.*, pp. 92.

¹¹ *Ibid.*, pp. 232.

Ancient literature also gives some information on the uses of *madhūka* wood. In Kautilya's *Arthasāstra*,¹ *madhūka* is considered to be an imperishable wood and cultivated in the state forests.² The *Śilparatna*³ includes a specific direction on the collection and selection of timber for building purposes. It says that 'one should better use trees that are straight, hard-wooded, strong and perennial such as *śāka*, *asaṇa*, *madhūka*, *sāla*.....' It specially mentions *madhūka* as suitable for posts for buildings.

At present this timber is used for many purposes. It is suitable for posts and is said to be exceptionally durable in water. Besides, it is used for heavy plankings, beams, scantlings, bridge-construction, oil- and sugar-presses and hubs of wheels and axles of carts. In the light of the present uses to which *madhūka* wood is put, it is difficult to say for what specific purpose the Kirāri post was actually used at that time. Sastri suggested various possibilities ; (1) a sacrificial *yūpa* ; (2) a pillar of *vājapeya* rites ; (3) a tank-pillar ; (4) a *jaya-stambha* ; and (5) a *dhvaja-stambha*. The Brāhmaṇas and Smṛitis specify *Aegle marmelos*, *Acacia catechu*, *Butea frondosa*, *Cordia myxa* and *Cedrus deodara* as suitable for sacrificial posts. As *madhūka* does not figure in the list, the pillar is not likely to be a sacrificial post. Whatever may have been its actual purpose it may be reasonably assumed that in its selection three main points were taken into consideration ; in the first place, durability in constant contact with soil and water ; secondly, strength as a post ; and thirdly, suitable grain and texture for writing letters on it. That the wood of *Madhuca latifolia* meets all these conditions there cannot be any doubt.

I thank Dr. N. P. Chakravarti, the Director General of Archaeology in India, for giving me an opportunity to examine this interesting specimen. Grateful acknowledgement is due to Dr. K. A. Chowdhury, Wood Technologist, Forest Research Institute, for valuable discussions and for extending to me the benefit of his extensive knowledge on ancient woods. My thanks are also due to Mr. Damar Singh of the Wood Technology Branch for his help in the laboratory.

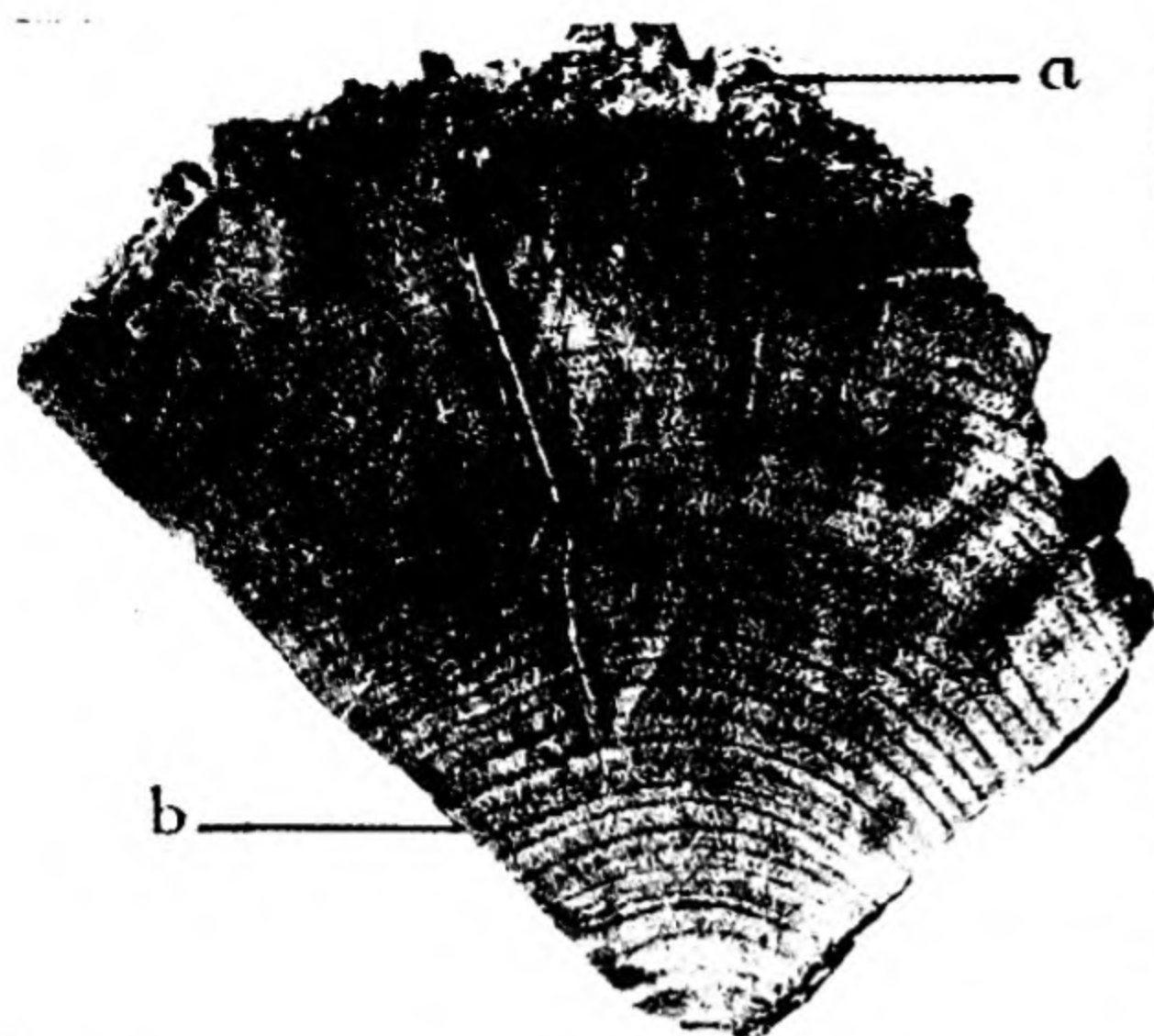
EXPLANATION OF PHOTOMICROGRAPHS (PL. I)

1. End-surface of the post showing (a) deteriorated and (b) sound portions. Note the growth rings and developing cracks. Scale : $\frac{1}{4}$.
2. Transverse section showing the general view. Vessels are in radial pairs and these are again arranged in radial chains. Minute black dots are parenchyma cells. Note their arrangement and distribution. Scale : $\times 15$.
3. Tangential section showing distinctly heterogeneous type of rays. Scale : $\times 30$.
4. Transverse section showing tyloses inside the vessels, uniseriate and multiseriate rays and net-like arrangement of parenchyma. Scale : $\times 30$.
5. Same, under high magnification showing the radial arrangement of fibres. The fibres are very thick-walled and closely packed in groups. Scale : $\times 110$.
6. Transverse section through the deteriorated portion. Compare the structure with sound portion (dense) as shown in no. 4. Scale : $\times 30$.
7. Same under high magnification to be compared with 5. Most of the fibres have disintegrated, a few remaining ones are visible here and there. The black portions indicate the position of the collapsed fibres. Scale : $\times 110$.

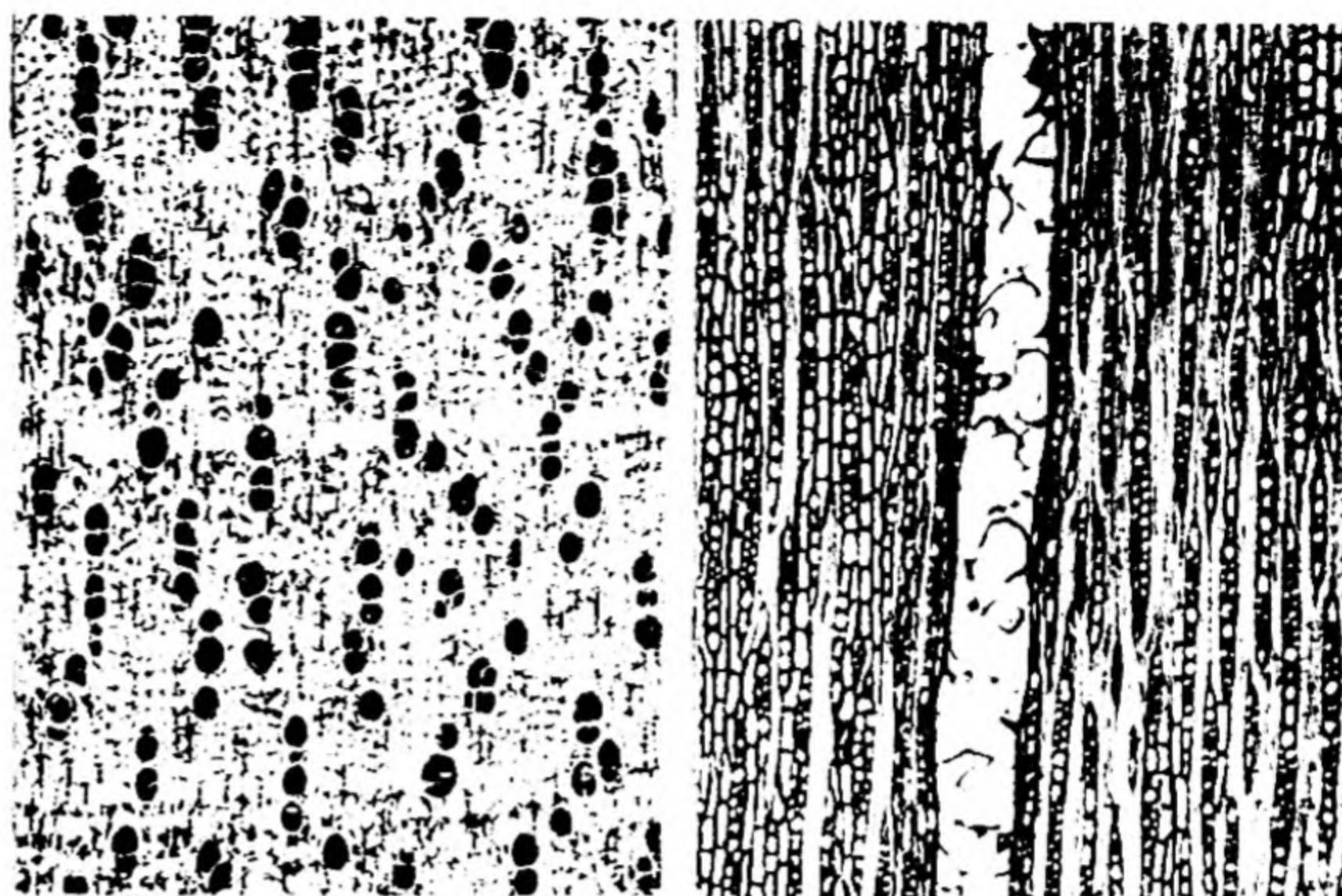
¹ Kautilya's *Arthasāstra*, English translation by R. Shamasastri, second edition (Bangalore, 1928), p. 117.

² *Madhūka* is also mentioned among the *āranyaka* trees both in the *Charaka-saṃhitā* and in the *Sukraniti*, *Sacred Books of the Hindus*, XVI (Allahabad, 1914).

³ *Some Aspects of Indian Civilization*, p. 257.



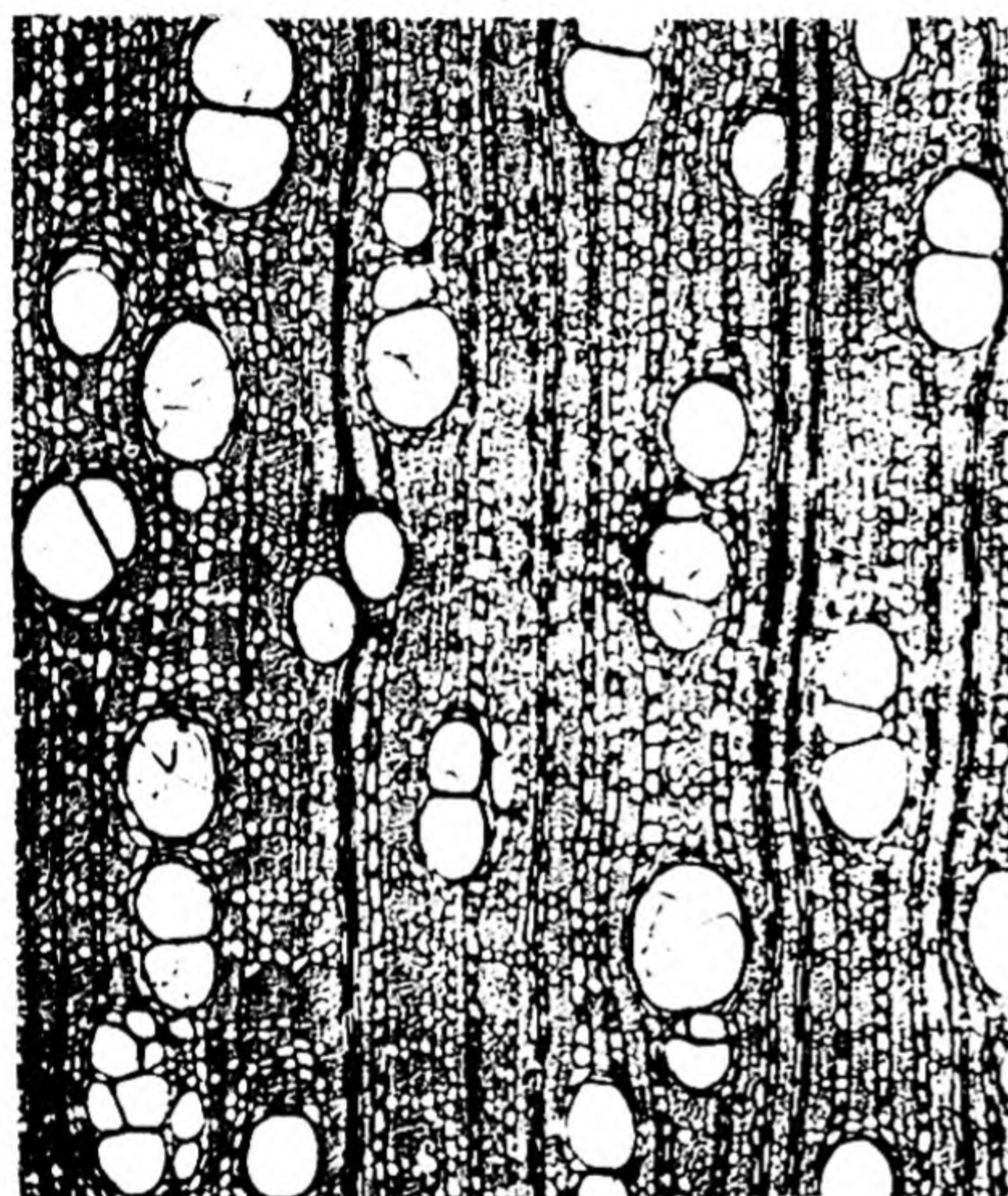
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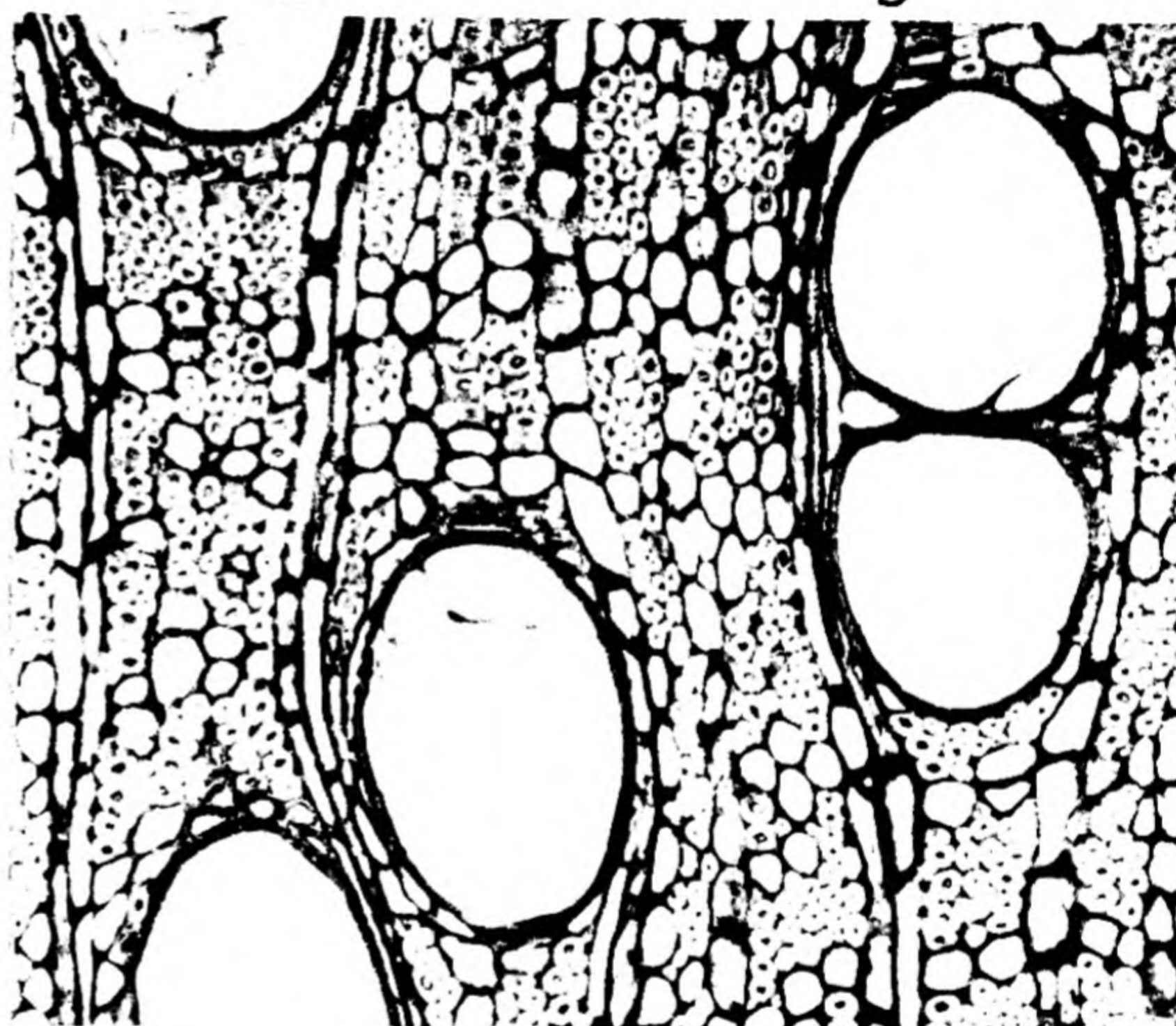
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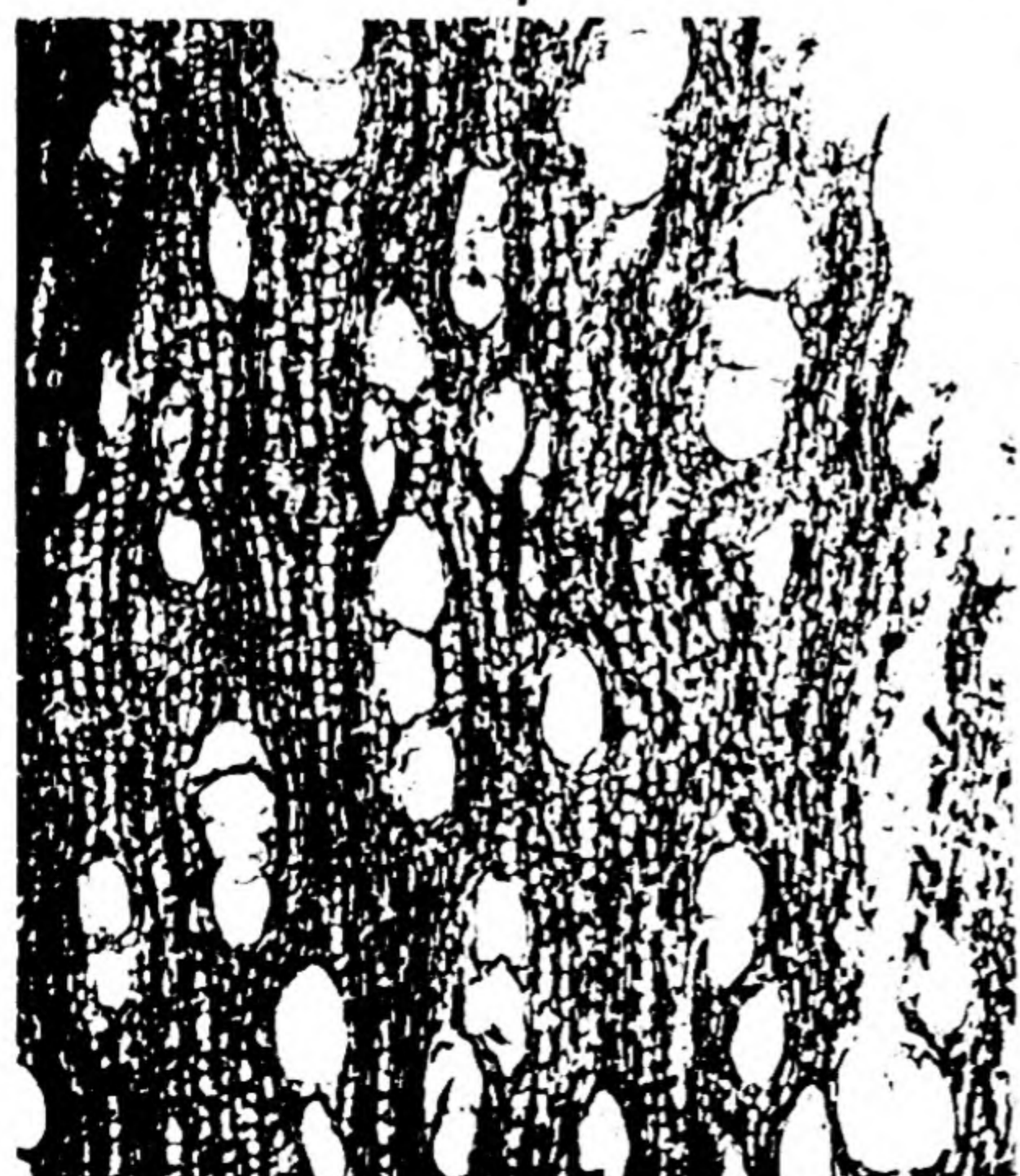
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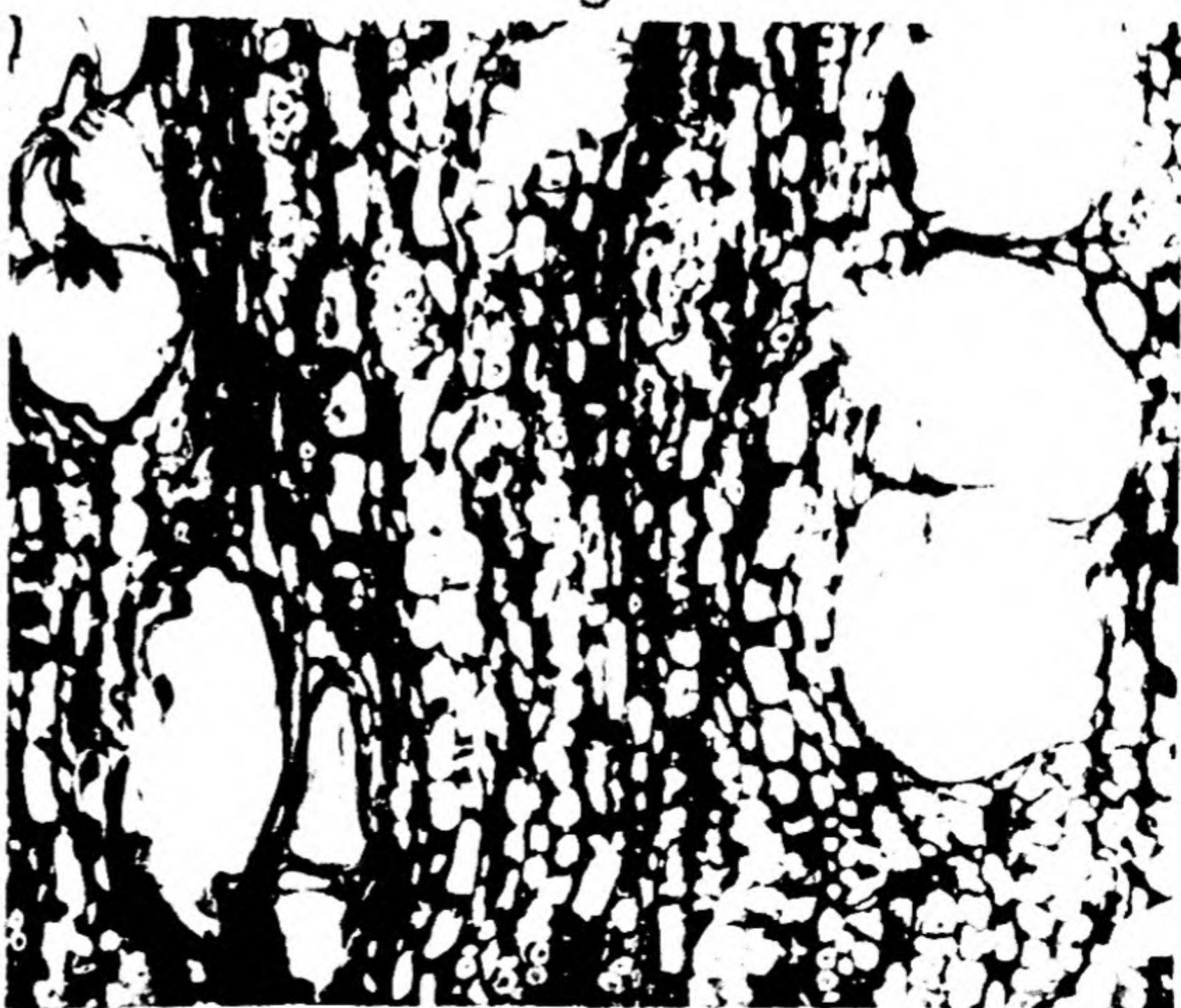
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GEOGRAPHICAL AND CHRONOLOGICAL FACTORS IN INDIAN ICONOGRAPHY

BY C. SIVARAMAMURTI

How different iconographic features of Indian deities underwent variations, modifications and embellishments in different localities and ages is discussed here by the Superintendent of the Archaeological Section, Indian Museum, Calcutta.

INDIAN iconography teems with problems that merit a careful study. The simpler and earlier types of figures develop into complex forms in the medieval period : additional attributes are created and earlier ones frequently discarded or modified. Sometimes earlier iconographic concepts change so vitally that the original ones are difficult to recognize. Ornaments, apparel, pose, delineation of the limbs—all these details change from time to time. In addition to the differences due to chronological reasons, the geographical factor largely contributes to variations in iconographic forms, for the same image-concept may have different manifestations in the same period in different parts of India. The study of these differences, due to age and locality, is of great interest.

EARLY FEATURES

In the earliest depiction of deities more than a single pair of arms is unknown. The few existing images of the first two centuries before and after the Christian era are simple and are based on the popular Yaksha type ; they represent an elementary iconography which grows into a complex one during the succeeding centuries. The cults of Kubera, Balarāma, Vāsudeva and Śiva are the most important in the two centuries B. C. : temples of Kubera and Balarāma are mentioned by Patañjali¹ (second century B.C.) and a Nānāghāṭ² cave inscription of the first century B.C. opens with an invocation of Vāsudeva and Saṅkarshaṇa (Balarāma). The famous *kalpa-druma* from Besnagar, Gwalior, now in the Indian Museum, Calcutta, must have formed the capital of a pillar (*dhvaja-stambha*) that stood in front of a temple of Kubera. In it we find the earliest representations of the gems (*nidhis*) that symbolize the glory of the god of wealth. The palm-capital from Pawāyā, also in Gwalior, doubtless adorned a temple of Saṅkarshaṇa. One of the earliest images of that deity, dating back to Śuṅga age, is preserved in the Lucknow Museum. No temple of Kāmadeva, so often referred to in Sanskrit literature, has survived, but we have a relic of such a temple in a crocodile- (*makara*-) capital of about the same age, also from Besnagar.

The crown of Viṣṇu and most other deities in medieval sculptures is absent in the earliest sculptures. Rudra, however, is described in the *Yajurveda* as *uśnīṣin*, or one wearing a turban. The representation of Śiva at Guḍimallam, which is assigned to about the second century B.C., shows him in this guise ((fig. 1, a)³. The turban was the only head-gear known and used, and the *mukuta-maṇi* or head-gem was wrapped in the turban centrally or towards one side. Saṅkarshaṇa in the Lucknow Museum mentioned above wears a turban, like the other deities of the period (fig. 1, b). Even Sakra, traditionally

¹ *Prāsāde Dhanapati-Rāma-Keśavānām, Mahābhāṣya*, ed. F. Kielhorn (Bombay, 1892), I, p. 436.

² *Archaeological Survey of Western India*, V (London, 1883), p. 60.

³ The line-drawings illustrating the article are by the author.

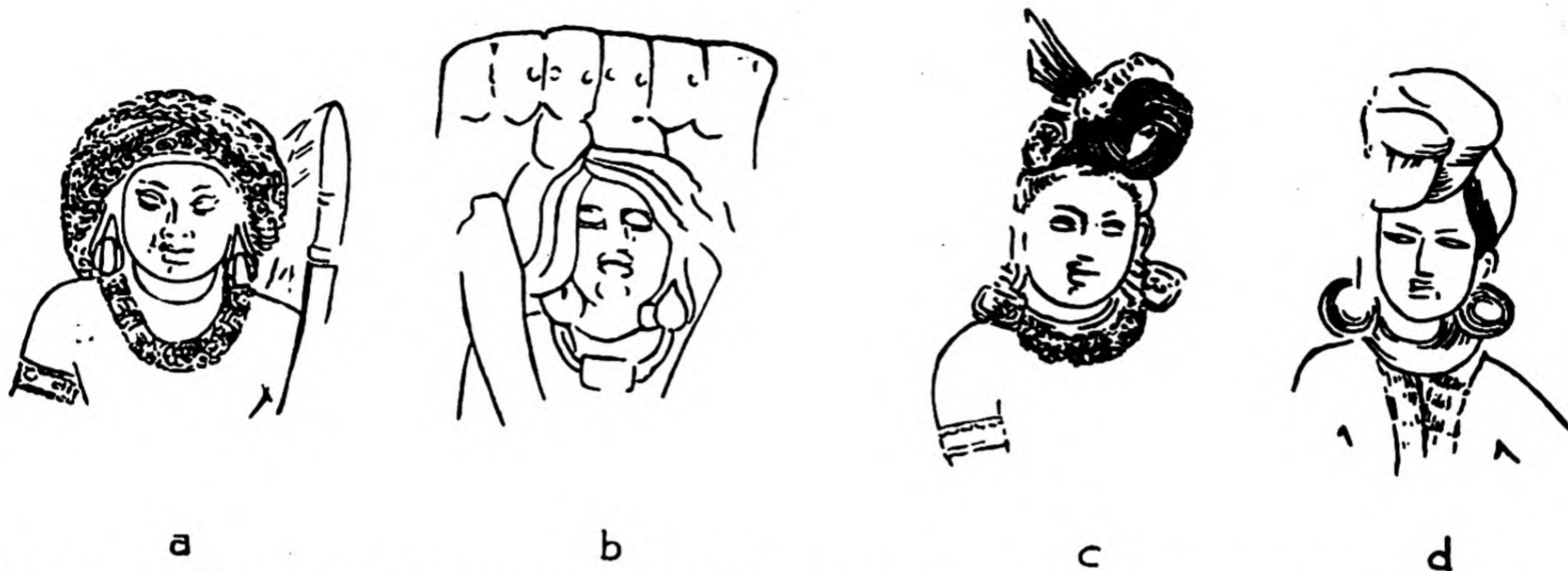


FIG. 1. a, Śiva as ushṇishin (wearing a turban), from Guḍimallam ; b, Balarāma as ushṇishin, in Lucknow Museum ; c, Sūrya as ushṇishin, from Bhājā ; d, Indra as ushṇishin, from Bhājā

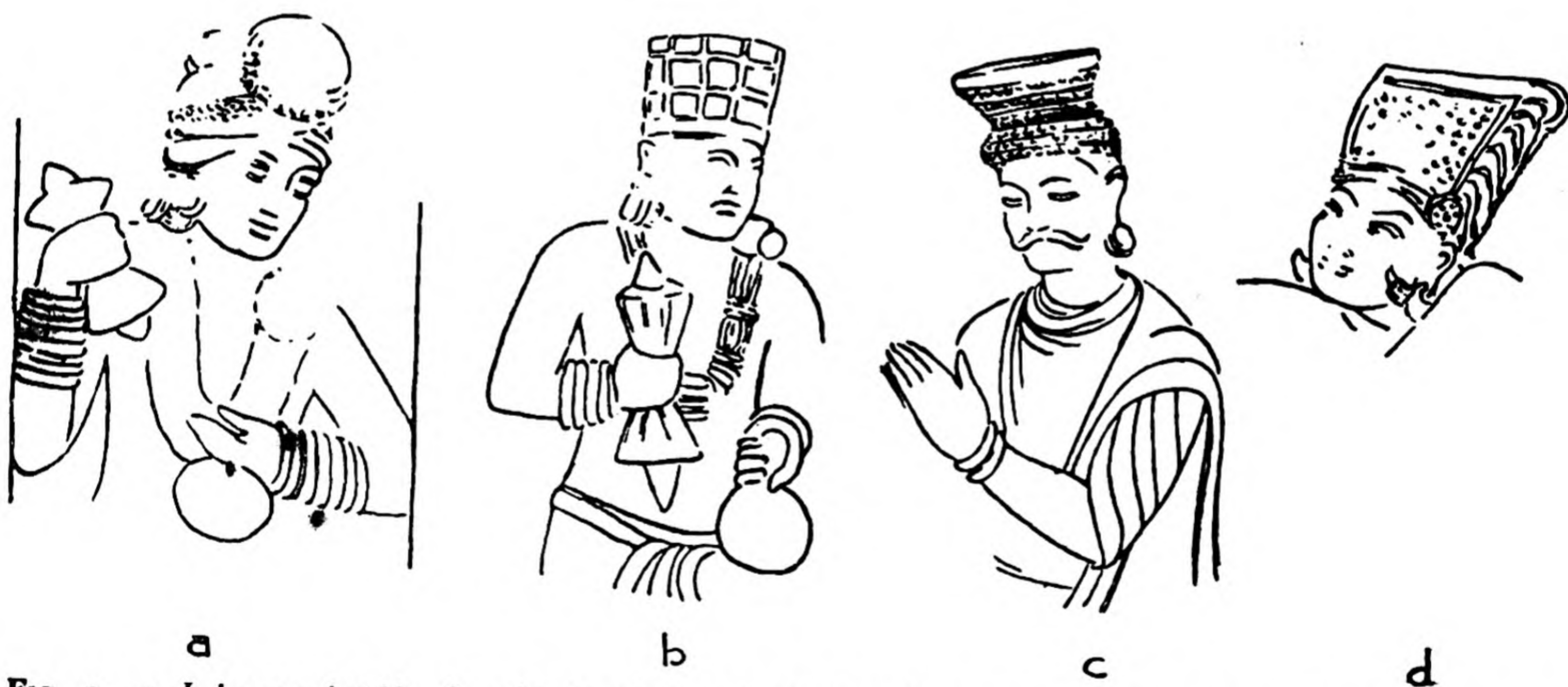


FIG. 2. a, Indra as ushṇishin, from Sānchī ; b-d, as kirīṭin (wearing a crown), respectively from Sānchī, Gandhāra and Amarāvati

the *kirīṭin* ('wearer of the crown'), wears only a turban in his earliest representation at Sānchī (fig. 2, *a*). The crown replaces the turban of Śakra in the later sculptures on the gates at Sānchī itself (fig. 2, *b*). But in Gandhāra (fig. 2, *c*), Mathurā and later Śātavāhana sculptures (fig. 2, *d*), Śakra wears a distinctive crown. The early date of Indra at Bhājā (fig. 1, *d*) is definitely indicated by the turban on his head. The thick *varamālya-dāma* (flower-garland) on his neck is explained by the description of deities as *sragvin* ('wearer of garlands') in the epics.

The thunderbolt carried by Vajrapāṇi in all Gandhāra sculptures is shaped like a bone (fig. 3, *a*) and perhaps suggests its origin from the bones of Dadhichi, famous in Indian literature. But in early indigenous sculpture, as at Amarāvati and Nāgārjunikonda, the thunderbolt is three-pronged at both ends (fig. 3, *b*), a feature that continues in medieval sculptures (fig. 3, *c-d*).

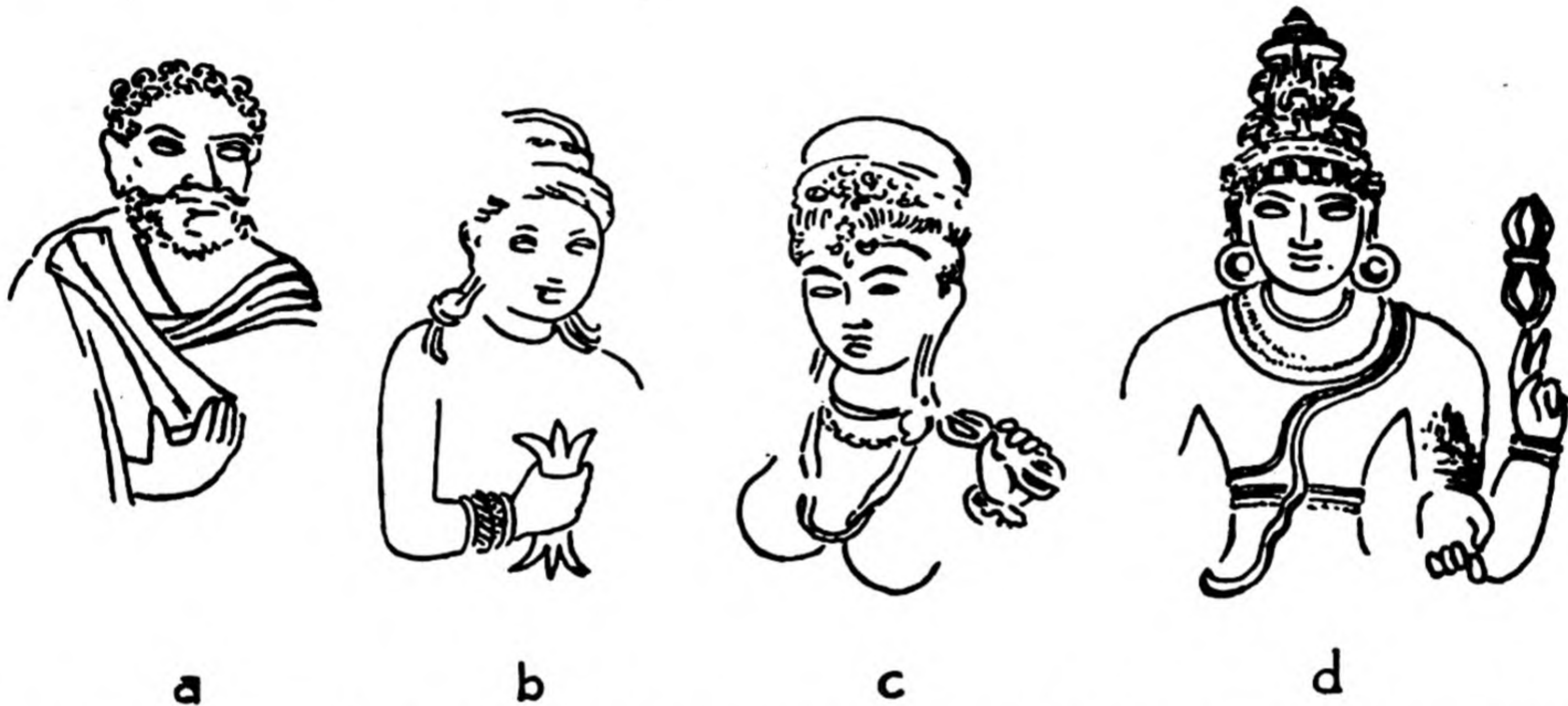


FIG. 3. Representations of vajra (thunderbolt) : *a*, as bone, from Gandhāra ; *b-d*, as a three-pronged weapon, respectively from Amarāvati, Ellora and Chidambaram

Sūrya, as seen in his earliest representations, for example at Bodh-gayā and Bhājā (fig. 1, *c*), has a turban and rides a chariot drawn by only four horses and his retinue is very simple ; but he wears the *kirīṭa* in medieval sculptures and the free movement of his hands, as seen in early sculptures, becomes frozen into the stereotyped pose of *khaṭakāmukha* for carrying lotuses by their stalks, which becomes a distinguishing characteristic of the deity.

The earliest representations of Gaṇeśa have only a single pair of arms, figures with four or more arms being invariably later. The beginnings of the form of Gaṇeśa should be traced to the dwarf Yaksha with elephantine face from an early rail-coping at Amarāvati, which shows early features like the absence of crown, a natural animal-head and a single pair of arms. It may be recalled that Śiva-gaṇas form the model for the dwarf Yaksha here and it is but natural that the Gaṇeśa type also occurs. In Gupta sculptures from Bhumarā these features, including only one pair of arms, are still present, but at Deogarh we already have a start in the direction of an additional pair of arms. The Gaṇeśa beside the dancing figure of Siva in the early Western Chālukyan cave at Bādāmi (sixth century) has only a single pair of arms and similarly the colossal Gaṇeśas at Biccavol (Godāvari District) and those in the Eastern Chālukyan territory generally lack the additional pair of arms and look extremely natural in the disposition of the limbs. The natural shape of

the elephant-head continues till the end of the early Chōla period (pl. IV A), and till about the eleventh-twelfth centuries nowhere do we find a Ganeśa with an unnaturally-shaped elephant-head.

The complex Buddhist pantheon of the medieval period is unknown in the earliest sculpture. Buddha, invariably represented by a symbol before the Christian era, is first portrayed in anthropomorphic form about the end of the first century, when at Mathurā he is represented with a single sinistral curl (fig. 4, *a*) or a line above the forehead (fig. 4, *b*). In Gandhāra sculptures he has a wavy knot of hair (fig. 4, *c*), and later Kushan and Gupta sculptures represent the protuberance on his skull and small curls all over the head (fig. 4, *d*). The flame above this is a feature added in medieval sculptures (fig. 4, *e*), more popular in South than in North India.



FIG. 4. Forms of Buddha's ushṇisha : *a-b*, Mathurā ; *c*, from Gandhāra ; *d*, from Sārnāth ; *e*, from Nāgapattinam

In the earliest sculpture one searches in vain for the *yajñopavīta*, which became an invariable feature in all later representations. The only semblance of the *yajñopavīta* which we find occasionally in early sculptures is the *vastra-yajñopavīta* or the upper cloth worn in *yajñopavīta*-fashion to the left (fig. 5, *a-b*) in accordance with the description in the *Yajurveda*. In very early sculptures from Bharhut, Bodh-gayā, Amarāvati and Sānchi there are representations of this type, which in medieval sculptures occasionally replaces the regular *yajñopavīta* on the representations of Dakṣiṇā-mūrti or Brahmā.

For the first time in Ikshvāku sculpture (third century) the *yajñopavīta* appears, long and composed of pearls (fig. 7, *a* and *b*), answering to the description of *muktā-yajñopavīta* of Kālidāsa.¹ This type, the *vastra-yajñopavīta* and the *ajina-yajñopavīta* (fig. 6) described in the Vedas occur in Gupta and medieval sculptures. In the paintings and sculptures of Ajantā the charm of the *muktā-yajñopavīta* is seen at its best (fig. 7, *c*), though it continues later in Chālukyan and Pallava-Chōla sculptures (fig. 7, *d* and *e*). A double-bell clasp (fig. 8) with ribbon and tassels (fig. 9) distinguishes the *yajñopavīta* of the early medieval period in South India ; it is shaped like a sinuous band, which separates into strands in later sculpture in South India (fig. 10). When this *yajñopavīta* runs over the right arm of a deity it suggests a very early medieval date for sculptures in South India and the Deccan (fig. 11). The development of ornamental motifs is clearly indicated by the changes in the Pallava, Chōla and other periods in South India not only of *yajñopavīta* (fig. 13, 2) but of *suvarṇa-vaukashaka* (fig. 13, 1), *udara-bandha* (fig. 13, 2), *kaṭisūtra* (figs. 12 and 13, 3) and the arrangements of drapery and tassels.

¹ *Kumārasambhava*, VI, 6.

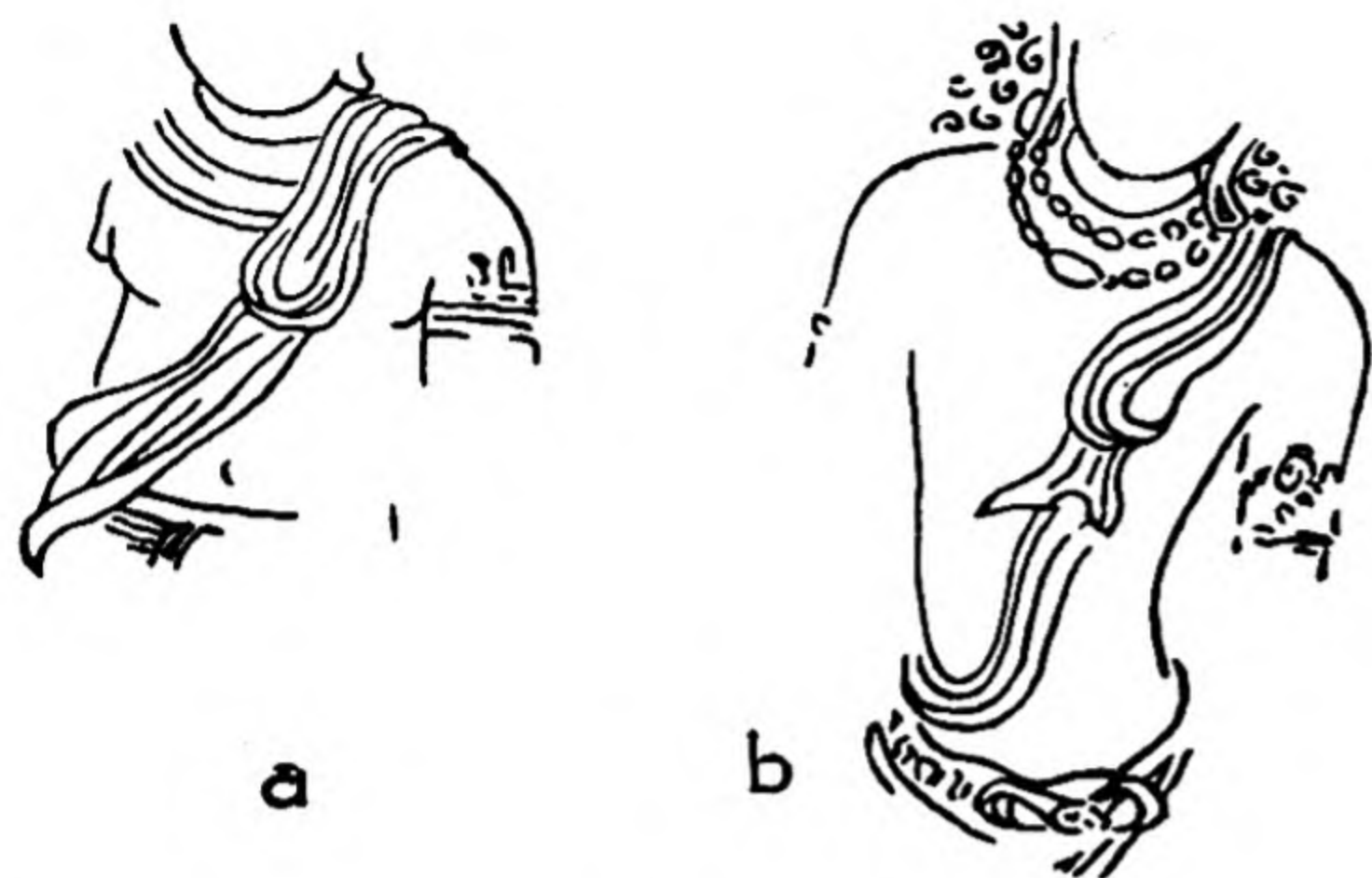


FIG. 5. *Yajñopavita* in cloth form : a, from Patna ; b, from Kāveripākkam



FIG. 6. *Yajñopavita* in deer-skin form, from Deogarh

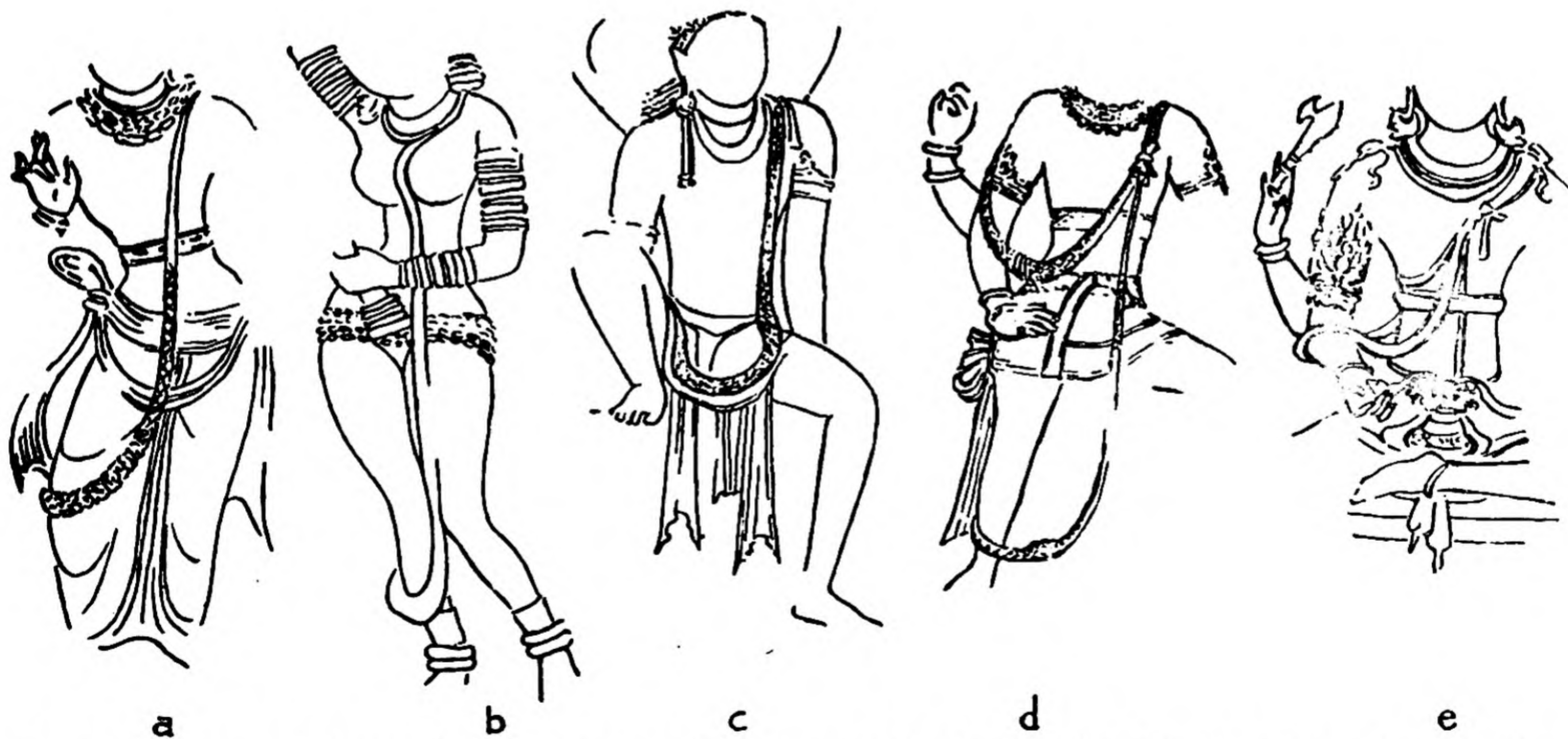


FIG. 7. *Yajñopavita* in pearl-string form : a, from Amarāvati ; b, from Nāgārjunikonda ; c, from Ajantā ; d, from Bādāmi ; e, in Madras Museum



FIG. 8. *Yajñopavīta* with double-bell clasp, sculpture in Madras Museum



FIG. 9. *Yajñopavīta* with ribbon and tassels, sculpture in Madras Museum



FIG. 10. *Yajñopavīta* as sinuous band, sculpture in Madras Museum



FIG. 11. *Yajñopavīta* running over the right arm, sculpture in Madras Museum

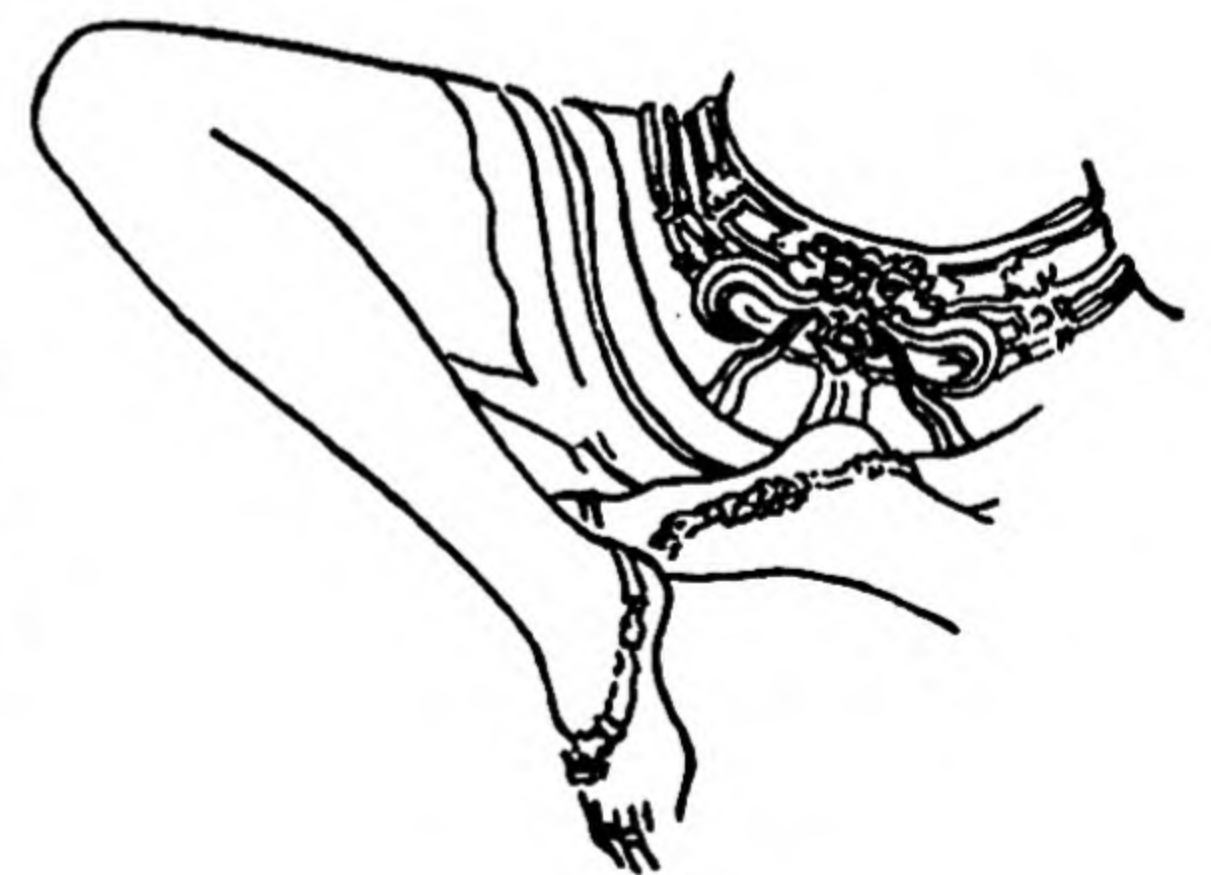


FIG. 12. *Kāṭisūtra*, sculpture in Madras Museum

1



a



b

2



a



b

3



a



b

FIG. 13. 1, *suvarṇa-vaikakṣaka* : a, from Mahābalipuram, b, from Tanjore ; 2, *yajñopavīta* and *udara-bandha*, a, from Tiruchirapalli, b, from Tanjore ; 3, *kaṭisūtra*, a, from Mahābalipuram, b, from Tanjore

Gajalākshmi, described as carved on the door-lintels of Rāvaṇa's *Pushpaka*-palace in *Laṅkā* by Vālmiki¹, is a very popular motif repeated on the gates of Sāncī (pl. II B) and represents Lakshmi as standing or seated on the lotus and being bathed by elephants. Lakshmi here has a single pair of arms, though in later sculptures she may have two (pl. II A) or even four hands and not only carries lotuses in a conventional manner but is seated in a rather stiff *padmāsana* pose.

The representation of river-goddesses, of which Gaṅgā and Yamunā are the most famous and occur frequently in Gupta and medieval sculptures of northern and central India, can be traced back to a concept of the goddess of plenty, a concept in which Śrī-Bhū and Nadi-devatās are commingled, and a beautiful damsel carrying food in a plate and water in a jar standing on a *makara*, Gaṅgā's vehicle, suggests the goddess of food, water, plenty and prosperity. An identical iconographic concept of this deity is represented at Mathurā and Amarāvati (fig. 14). Divested of the food-plate or the *sasya* (corn) symbolizing Prithivī and with only the water-jar in her hand and standing on her vehicle, the goddess is identical with the Nadi-devatā. At Amarāvati, both the river-goddesses on either side of a central theme stand on *makara*, which in the earliest sculptures was the common vehicle for all Nadi-devatās (pl. II D). In later days the *makara* came to be associated only with Gaṅgā, and in Gupta sculpture the tortoise appears as the vehicle of Yamunā.



FIG. 14. Damsels carrying food and water, respectively from Mathurā and Amarāvati

¹ Rāmāyaṇa, V, vii, 14.



A



C



B



D

A and B, *Gajalakshmi*, respectively from *Mahābalipuram*, *Chingleput*, and *Sānchī*, *Bhopal*; C, *Gangā* on door-jamb, from *Tāḍpatrī*; D, river-goddess from *Amrāvati* rail (*British Museum*)



A



B



D



E

*Chail, Tanjore; C, from Bihar (Indian Museum);
Museum); E, from Rajasth*



A



B

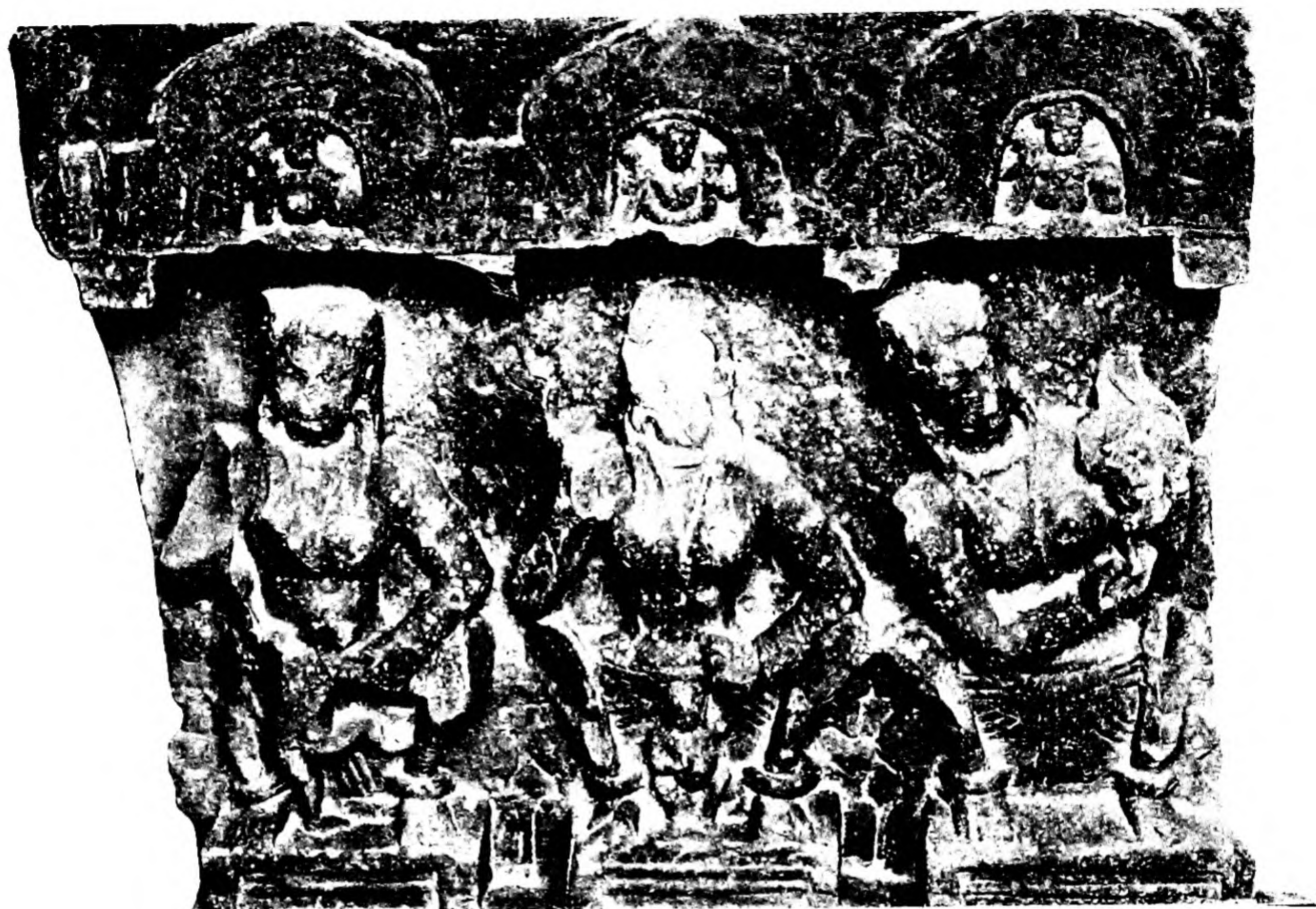


C



D

*Gaṇeśa. A, from Biccavol; B, from Velankaṇṇi, Tanjore (Madras Museum); C, from Halebūd;
D, from Felgrām, North Bengal (Indian Museum)*



A. Mātrikās, from Mathurā (Mathurā Museum)



C. Vārāhī, from Jāṅpur, Cuttack

As one enters the imposing *gopuras* of South Indian temples, one sees on either side of the door-jamb the representation of a woman standing on *makara* and holding a thick creeper, which issues from the mouth of the *makara*-vehicle beneath her feet and runs up in sinuous fashion, forming a sequence of circular medallions enclosing carvings of deities (pl. II C). On both sides the vehicle is a *makara*. The concept here is a combination of Gaṅgā with the early *vrikshakā* or *śālabhañjikā* figures that we find at Sānchī and elsewhere.

In Pallava and Chōḷa temples in South India a fat short lady, with a conspicuous belly and peculiar headgear, with a bovine-headed youth and a beautiful damsel on either side and with a crow-banner, attracts attention. This deity, known as Jyeshthā, is the goddess of sloth, misfortune and everything inauspicious ; she is therefore considered Alakshmī, the opposite of Lakshmī, the goddess of fortune, whose elder sister she is. Her worship, with a view to avoiding misfortune, was popular, and in the Pallava and Chōḷa periods shrines for Jyeshthā were freely erected. In almost every Chōḷa temple of repute Jyeshthā has a shrine, but from the late Chōḷa or Vijayanagara period onwards her worship fell into disuse.

In and after the Kushan period the Sapta-mātrikās have had their representations, and in the early ones all the Mātrikās are youthful goddesses (pl. V A). The beauty of these goddesses carrying children on their laps is best observed in the Brāhmanical caves of Ellora. Even Vārāhī has here a human face, and Chāmundā is not the fearful emaciated skeleton that she is in later sculptures.

LATER REGIONAL VARIATIONS

SŪRYA

The locality, no less than the age, in which a deity is carved may determine the form of the figure. Sūrya in a chariot drawn by four horses can at once be distinguished as early (pl. III A), for in later representations the chariot has seven horses. Similarly a Sūrya with bare feet can at once be recognized as being from South India (pl. III B) or the Deccan and can be distinguished from his North Indian representations with top-boots (pl. III C), probably following the direction given in the *Bṛihatsaṃhitā* that Sūrya should have the 'northern dress'.¹

In the representations of Sūrya from North India a great retinue is always shown as attending on him : Danda and Piṅgala, one a scribe and the other an aide-de-camp, stand beside him on either side, and his wives, Chhāyā and Suvarchasā, flank him. Aruṇa drives his chariot drawn by seven horses, which are shown like the pigs yoked to the chariot of the Buddhist goddess of dawn, Mārīchī, whose concept is based on that of Sūrya. Other attendants of Sūrya are two amazons carrying a drawn bow and arrow to shoot at and dispel darkness. Sometimes more attendants are represented, but Danda and Piṅgala, Chhāyā and Suvarchasā and especially the amazons are always found in representations from Uttar Pradesh, Rajasthan (pl. III E), Gujarat, Orissa, Bihar and Bengal (pl. III D). The amazons occur even in the early medieval sculpture at Ellora, and this feature, though essentially a North Indian one, is found as far south as the Hoysala area. Chhāyā and Suvarchasā are represented everywhere except in the Tamil country, where their representation is very rare ; Sūrya is here shown almost always alone, bereft of retinue and with neither the chariot beneath his feet nor the horses. Even in late

¹ N. K. Bhattasali, *Iconography of Buddhist and Brāhmanical Sculptures in the Dacca Museum* (Dacca, 1929), p. 158.

Chālukyan sculpture from the Telugu and Kanarese districts the queens and the horses are not omitted.

GANEŚA

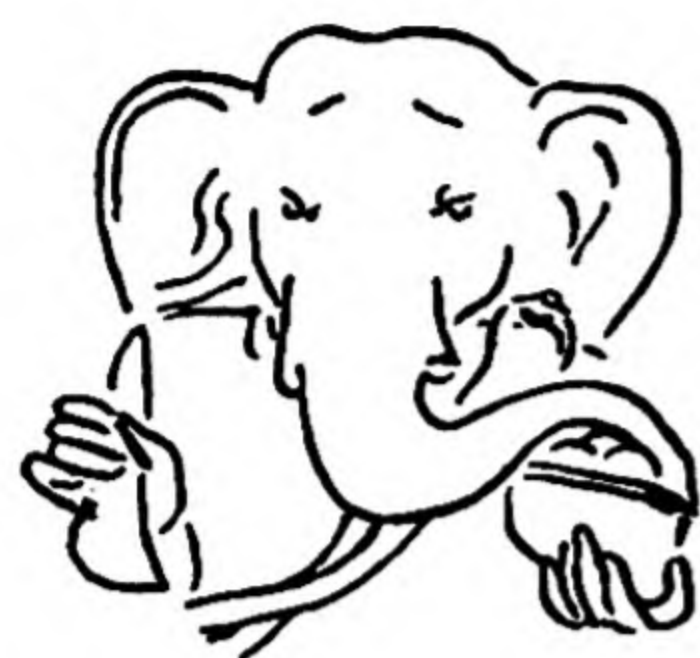
Ganeśa in the Telugu (pl. IV A) and Kanarese districts (pl. IV C) is easily distinguished from Ganeśa in Chōla territory (pl. IV B). The Orissa type of Ganeśa is distinct and the Ganeśa from Bengal (pl. IV D) and Bihar is yet another type. Taking the trunk of Ganeśa alone, its disposition betrays the locality of the figure. In the Tamil country the Ganeśas of the Pallava, Chōla and slightly later periods are distinguished by most of the length of the trunk running down vertically on the paunch and finally curving to touch the sweets in the left palm (fig. 15, 2). The Ganeśa of the Kanarese districts, on the other hand, has the entire trunk turned to the left with a curve at the tip which rests on the bowl of sweets in the left hand (fig. 15, 1 c). The trunk of the Ganeśa of the Orissa school sometimes twirls slantingly and sinuously towards the bowl in his left hand (fig. 15, 3 a).

In all South Indian representations of Ganeśa, the *karanda-mukuta*, prescribed for goddesses and juvenile deities, is specially used (fig. 15, 2). But in the early representations in the Western and the Eastern Chālukyan area, the crown is absent and the elephant's temples are fashioned in a natural manner (fig. 15, 1 b). The type of Ganeśa represented in the Gupta sculpture at Deogarh, Jhānsī District (fig. 15, 1 a), without the *kirita*, embodies Gupta tradition and is the source of inspiration for the style in the Chālukyan area. Like Śiva, Ganeśa in Orissa, Bengal and Bihar wears the *jaṭā-mukuta* (fig. 15, 3), a feature absent elsewhere in India. Similarly it can be noticed that the decorative treatment of Ganeśa is at its peak in the later Chālukyan period. The strings of bells that adorn Ganeśa in comparatively early sculptures from the Kanarese districts are as distinctive as the profuse pearl and gem-set jewellery adorning this deity in late Chālukyan and Hoysala sculpture (fig. 15, 1 c). In Java, Ganeśa's headgear has a skull on it and he is so seated that the soles of his two short legs come together.

THE SAPTA-MĀTRIKĀS

The representation of the Saptā-mātrikās also presents interesting local and chronological divergences. In early Pallava representations of the group (fig. 17), in Nolamba sculptures of about the ninth century (fig. 16, b) and even in early Chōla sculptures (fig. 16, a) and later in the Tamil country, Chāmunda is represented as a youthful woman with dishevelled hair and wearing *nāga-kuchabandha* (breast-band of serpents) and *kapāla-yajñopavīta* (*yajñopavīta* of skulls). But in late medieval Chālukyan sculptures, those from the Kanarese districts and in the ones from Orissa and Bengal, the representation of Chāmunda is as an emaciated woman with sunken eyes and skeleton-frame, frightful to behold. Though some iconographic texts, e.g. the *Vishṇudharmottara* and *Pūrvakāraṇāgama*, require a corpse as her vehicle, she is usually represented with a jackal as her vehicle in South India and the Deccan. In the representations from Orissa and Bengal, a corpse is placed beneath her with a jackal close to it. One of the finest representations of Chāmunda answering to this description is from Jāipur in Orissa (pl. V B). At Ellora Chāmunda has the owl as her vehicle, as the *Pūrvakāraṇāgama* requires her to be represented. The early human sculpture for Vārāhi is replaced by a boar's head in medieval sculpture (pl. V C).

1



a



b



c

2



a



b



c

3



a

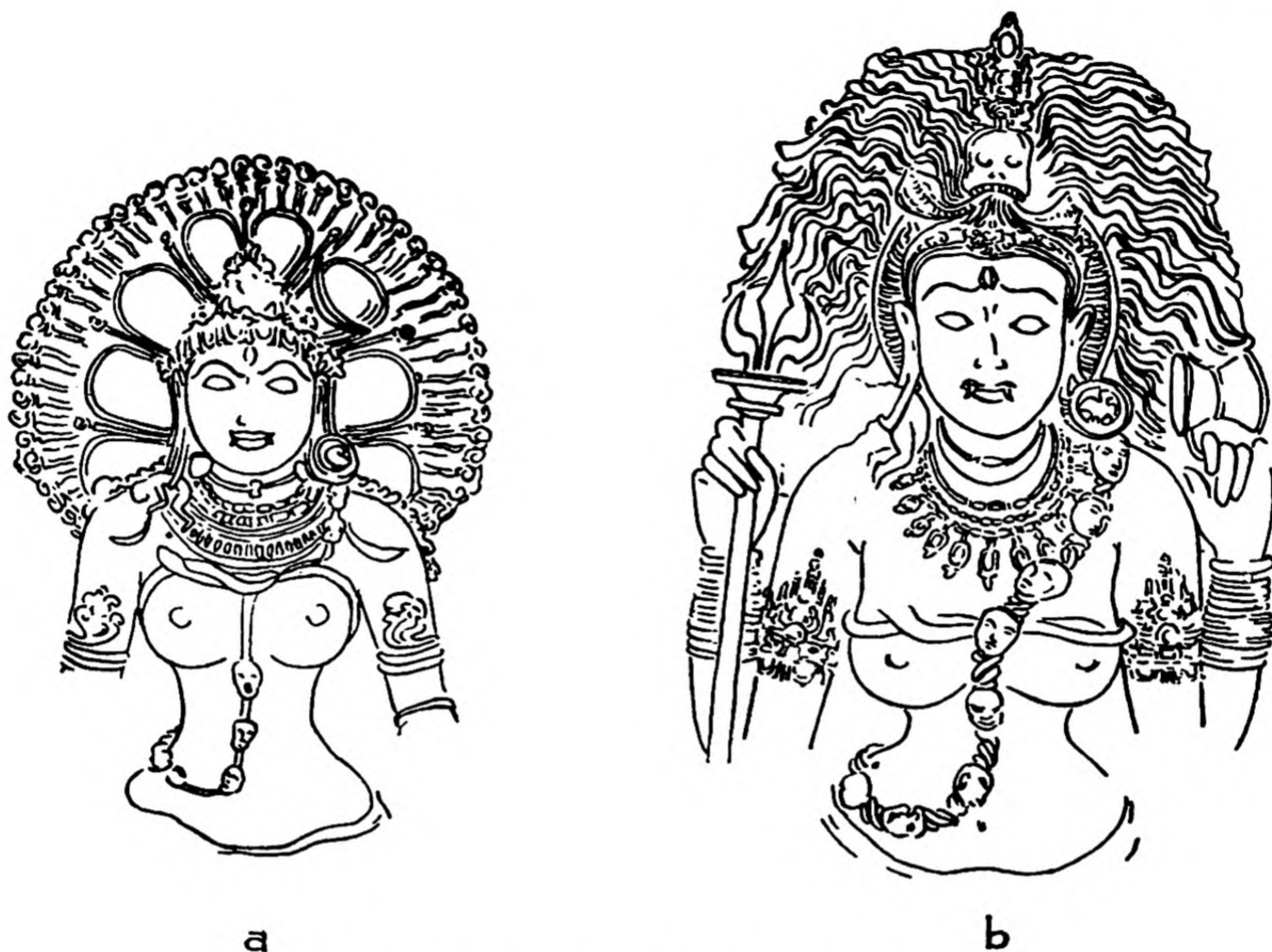


b



c

FIG. 15. Forms of trunk and crown of Ganeśa : 1, a, from Deogarh, b, from Bādāmi, c, from Halebid ; 2, a, from Tiruchirapalli, b-c, in Madras Museum ; 3, a, from Mukhalingam, b, from Orissa, c, from Bihar

FIG. 16. *Chāmūṇḍā*, in *Madras Museum*

MAHISHAMARDINĪ

The representation of Mahishamardinī as attacking the demon (with a human body and a buffalo's head), riding a lion and carrying weapons in her hands, is popular in the early medieval sculptures of South India and the Deccan, as is seen in the famous Mahishamardinī panel at Mahābalipuram (pl. VI A) and a similar panel in the rock-cut temple at Ellora (pl. VI B)¹. The other scene, namely cutting off the head of the buffalo-demon, is also frequently represented. The goddess standing on a buffalo is as peculiar to Java as the form standing on the buffalo's severed head is to South India (pl. VI C). The act of cutting off the head of the buffalo is a more popular theme with the northern sculptor, and this is found depicted all over Uttar Pradesh, Bihar (pl. VII A), Bengal, Orissa and the Chālukyan area.

KĀLĪ

In the early specimens of South India, in both the Tamil and the Kanarese areas, the early medieval sculptures of Kālī and Chāmūṇḍā show her with flaming hairs, the *lapāla-yajñopavīta*, *nāga-kuchabandha* and a special characteristic, the *preta-kūṇḍala*, a ring

¹ R. P. Chanda, 'Medieval Indian Sculpture', *An. Rep. Arch. Surv. Ind.*, 1929-30 (1935), p. 220.



A



B



C

*Mahishamardini: A, from Mahābalipuram, Chingleput; B, from Ellora, Hyderabad;
C, from Kumbakonam, Tanjore*



A



B



D



A, Mahishasura (Indian Museum); B, Pārvatī from Jāmbavanodai, Tanjore (Indian Museum); C, Pārvatī from Manjolai, Rājshāhī (Rājshāhī Museum); D, Pārvatī from Tipperah (Indian Museum)

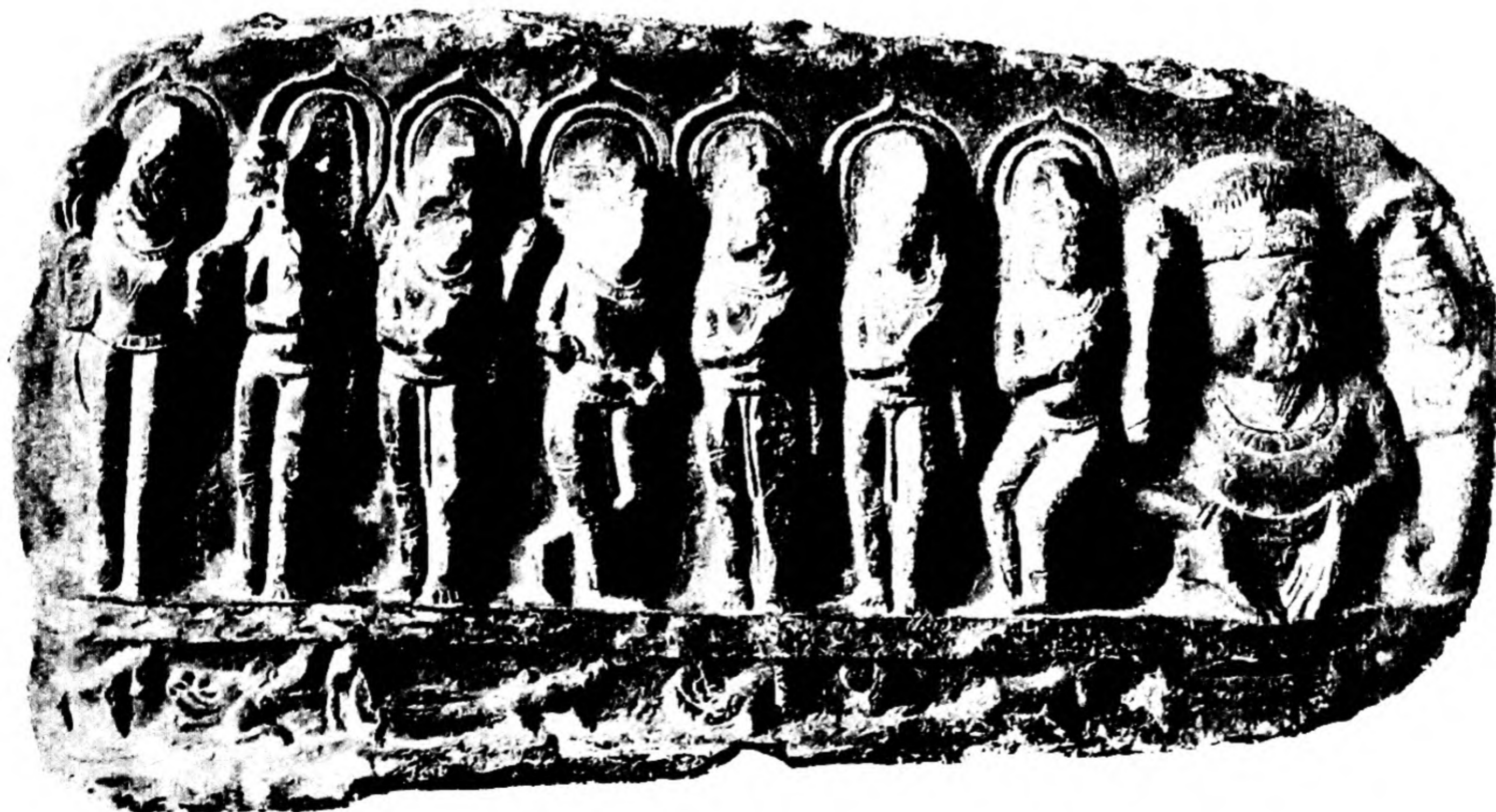


A



B

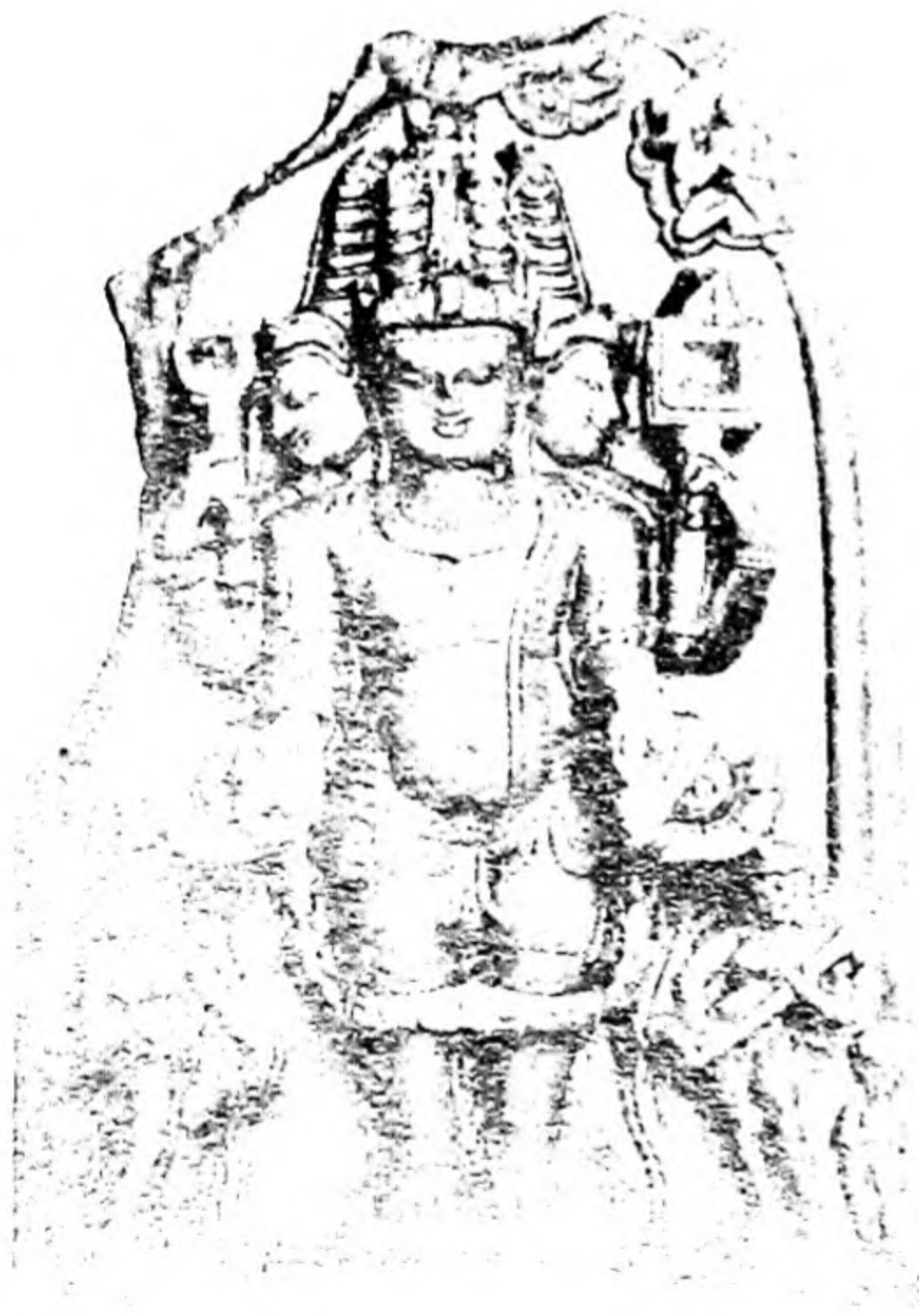
Agni: A, in Madras Museum: B, from Bihar



C, Navagrahas, from Gorakhpur



A, *Navagrahas. from Sūryanārkoil, Tanjore*



C

D

C, *from Banaras (Indian Museum);*
D, *Tanjore*

on the right ear with a corpse suspended from it (figs. 16 and 17). Like the *yajñopavīta* in other Pallava sculptures, the *kapāla-yajñopavīta* of Chāmuṇḍā has the tendency of going over the right arm. The Chāmuṇḍā of the Sapta-mātrikā group from Satyamangalam (South Arcot District), now preserved in the Madras Museum, is a good example of the Pallava representation of the deity. In all periods Chāmuṇḍā is represented in the Tamil districts with normal physical proportions, while in the Kanarese districts later medieval sculptures show her as a fearful and emaciated woman. The sculpture from Hemāvati is still normal, as it is not so late and conforms to the standard of the Ellora Mātrikās which are a century earlier in date.



FIG. 17. Chāmuṇḍā, from Satyamangalam (Madras Museum)

PĀRVATĪ

When this goddess is represented in South India with a single pair of arms, she holds the *līlā-kamala* or sportive lotus in one hand, while the other hand hangs free in *lola* position when she is standing (pl. VII B), or rests on the seat when she is seated. When she is represented with four arms, one pair of arms carries the *pāśa* (noose) and *aṅkuśa* (goad), while the other pair is either in *abhaya* and *varada* or carries the cane-bow and flowery arrows. The rosary, flower, *abhaya* and *varada* also engage the four hands of the deity in some cases as also the *ratna-kalāśa* (pot of gems) and the lotus. She may be shown wearing either a *jaṭā-mukuṭa* or *karanda-mukuṭa*. In the sculptures from Bengal it is mostly the rosary, a peculiar trident, *ratna-kalāśa* and *varada* that determine the disposition of hands of the deity (pl. VII C). The *varada*-hand sometimes carries a fruit or flower. Sometimes she is shown with a single pair of arms (pl. VII D). The *jaṭā-mukuṭa* is also always present, though there is a pearl-ornament over it. The *karanda-mukuṭa* never occurs here: in fact it is unknown in the sculptures of these parts.

CONSORTS OF DEITIES

In all cases where two wives occur with a deity in South India, as in the case of

Vishṇu, the principal one, always to the right, wears a *kucha-bandha* (breast-band), sometimes beautifully ornamented (fig. 18). But in the case of Śiva, even though Gaṅgā and Pārvatī are both present, the *kucha-bandha* on Pārvatī is absent, as Gaṅgā does not appear beside Śiva but on his locks. In all normal cases, however, where two wives are present, such as Śrī and Bhūdevī, Vallī and Devasenā, Rukmīṇī and Satyabhāmā, the consort to the right has the *kucha-bandha*. This feature is absent in North Indian sculpture.



FIG. 18. Disposition of ornamental *kucha-bandha* (breast-band) on *Devī*, in Madras Museum



FIG. 19. Gupta coin showing king flanked by two damsels on obverse and lady amidst lotuses on reverse

The consorts of Vishṇu are Śrī and Bhūdevī everywhere except in sculptures of north-eastern India, where it is Śrī and Sarasvatī on either side. Sarasvatī is more commonly known as the spouse of Brahmā, and it is rather surprising to find her in Bengal sculptures as a consort of Vishṇu. The tradition of representing Vishṇu with Śrī and Sarasvatī seems to be fairly old, as is seen in an early medieval sculpture in the Dacca Museum, the date of which is indicated by harp-type of *vinā* in the hands of Sarasvatī, a type never found in sculpture after the ninth century. Even on a type of Gupta coins (fig. 19) the king is shown seated on a conch with two goddesses, presumably representing Śrī and Sarasvatī, approaching him from either side. Exceptions to the general rule of Śrī and Sarasvatī as spouses of Vishṇu in north-eastern sculpture are to be seen in the representations of Vishṇu from Sāhebganj (Santal Parganas) and Sāgardīghī (Mūrshidābād District), in which Śrī and Bhūdevī flank the god.

AGNI

In early medieval representations of Agni all over India that follow earlier traditions the common features are that he has only a single pair of arms and that either the flames are present as a crown as in a early Chōla sculpture from the Madras Museum (pl. VIII A) or are all over his body as in a sculpture from Bihar in the Indian Museum

(pl. VIII B). This latter method of representation follows the earlier Kushan tradition from Mathūrā. In the representations of Agni in South India a beard is unknown, but in Bihar and Bengal the beard is an invariable factor. Even in one of the modern paintings of Agni by one of Bengal's reputed painters of the new revivalist school the form of Agni is so conceived that the beard vies only with the shaggy coat of the ram-vehicle in producing the flame-effect in the picture.¹ Here the depiction of the two heads, four horns, seven arms and three legs follows the later tradition popular all over the land, a late Chola example of which, without the beard, is found in the famous temple of Naṭarāja at Chidambaram.

THE PLANETS

The representation of planets in South India is never in a row as in North India (pl. VIII C). The position of each planet is defined, Sūrya being at the centre and the other eight planets at the corners and in between on all the four sides. Some may be represented with two hands, others with four (pl. IX A). Though in South Indian sculptures Chandra is represented with lilies in both his hands and the *chandra-maṇḍala* (lunar disc) behind his head (like Sūrya carrying lotuses and with the *bhā-maṇḍala*—luminous disc—behind his head), Chandra in North India carries a *gadā* in one of his two hands. Similarly all the other planets are shown with only two hands each. Rāhu is depicted all head and just two arms. The head is crowned with snake-hoods, as is usual all over India, the face itself being frightful and grizzly. The hands are held downwards as if in the act of pouring something ; and, when we remember that the *Rūpamaṇḍana* prescribes a sacrificial pit as his seat, the hands in *pushpa-puta* as if offering *āhuti* should suggest the pit. It is also possible that this pose of the hands suggests the act of eating, as according to Bharata's *Nāṭyaśāstra* (IX, 145) *samyuṭa-hasta* indicates eating. A sculpture from the Navagrahas from the Rājshāhī Museum shows the moon in the hands of Rāhu, and this makes the scene of eating very clear. In North Indian sculptures, moreover, the planets are always represented in a row in separate little panels one beside the other, and the whole frieze serves as a lintel of the entrance of a shrine, usually in the *jagamohan* (front porch). This is an essential difference between the representations of Navagrahas in North and South India.

LOCAL DEITIES

A number of deities are purely local ; an instance is Hariharaputra, the son of Śiva, and Mohinī (Vishṇu). Representations of this deity are very common in South India, especially in the Tamil districts and Malābār, but are not found elsewhere. The North Indian deity Revanta is equally unknown in South India and the Deccan ; similarly, Manasā, so popular in Bengal, is unrepresented elsewhere.

BRAHMĀ

Like all deities who are especially called *tridaśas* or 'ageless', the youthful representation of Brahmā is common in central and eastern India. But in Chālukyan sculptures and medieval sculptures from Gujarat and Rajasthan Brahmā is represented with a beard like an old sage, emphasizing the *Pitāmaha* (grandfather) aspect of the god. In

¹ Painting of Agni by Nandalal Bose, reproduced in D. A. Mackenzie, *Indian Myth and Legend* (London), pl. facing p. 20.

early sculptures from the Bādāmi-Aihole region, however, the beard is totally absent, in accordance with the earlier Gupta tradition, as in the bronze image in the Karachi Museum and on the representation on a lotus in the Śeṣhaśāyin panel from Deogarh (pl. XI A). Examples of bearded Brahmā come from the Bellary District, Dhārwar, Gujarat, Kālanjar, Sopārā, etc. Even in Bengal there are rare instances of bearded representations. But he is shown there as pot-bellied and somewhat dwarfish (pl. IX B and C), a late medieval North Indian tradition, absent in South India, where his body-contours are as slim as those of any other deity (pl. IX D).

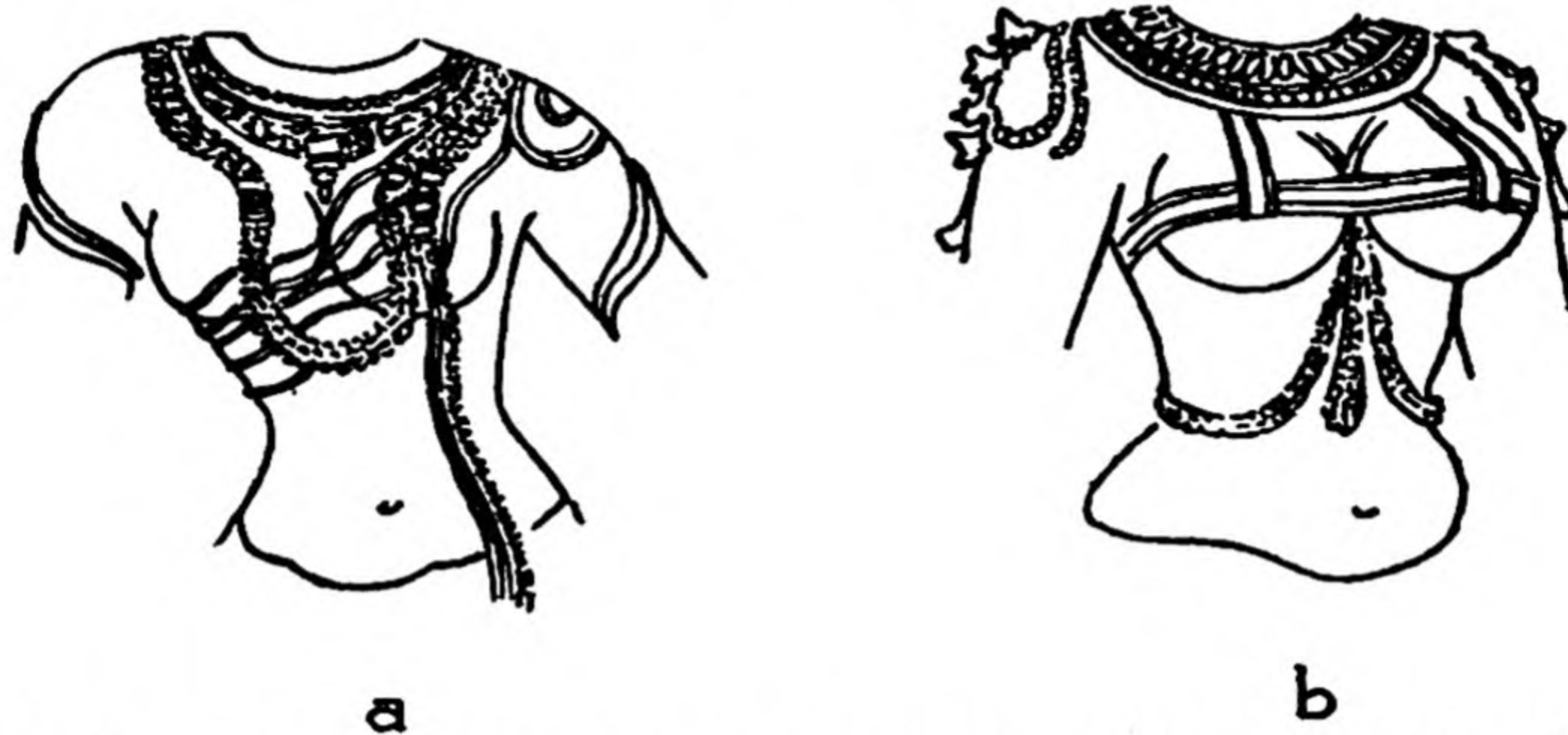


FIG. 20. *Stanottariya and kucha-bandha as covering for breasts in, a, Bengal and b, Tamil sculpture*



FIG. 22. *Mode of holding weapons : a, natural, sculpture in Madras Museum; b, in kartarimukha, bronze in Madras Museum*

FIG. 21. *Dvārapāla wearing yajñopavīta in flower-garland form : a, from Kāveripākkam ; b, from Vijayawāda (both in Madras Museum)*

CLOTHING, ORNAMENTATION AND WEAPONS

A flowing cloth, shown by a wavy line over the chest in the *upavīta* fashion or over the thighs in the *antariya* (lower garment) fashion, mostly in the case of male deities and sometimes as the *stanottariya* (covering for the breasts) of goddesses, is peculiar to the Pāla sculpture of Bengal (fig. 20, a), where the finest Dacca muslin, the most coveted cloth for aristocratic use, was produced until recently.

Sometimes local peculiarities travelled from one area to another. An example of this is the special type of late Pallava sculptures found in Kāveripākkam (North Arcot District), where many Chālukyan influences may be noticed in the local style. Thus the thick roll of *yajñopavīta* with flowers, especially large lilies, at regular intervals running over the right arm of the Pallava *dvārapālas* (fig. 21, a) from Kāveripākkam is typical of early Chālukyan sculptures, as in the colossal inscribed figure of a *dvārapāla* from Vijayawāḍa (Krishnā District) (fig. 21, b), executed by a sculptor in the court of the early Eastern Chālukyan kings of Veṅgi. The intricately-worked ornamentation and special pearl-decorations are all reminiscent of the Chālukyan style. This influence is accounted for by the Rāshtrakūṭa inroads into Pallava territory during the time of the last kings of the dynasty, and the evidence of influence in art and architecture in places like Kāveripākkam lend additional support to the epigraphical evidence for the military conquests.

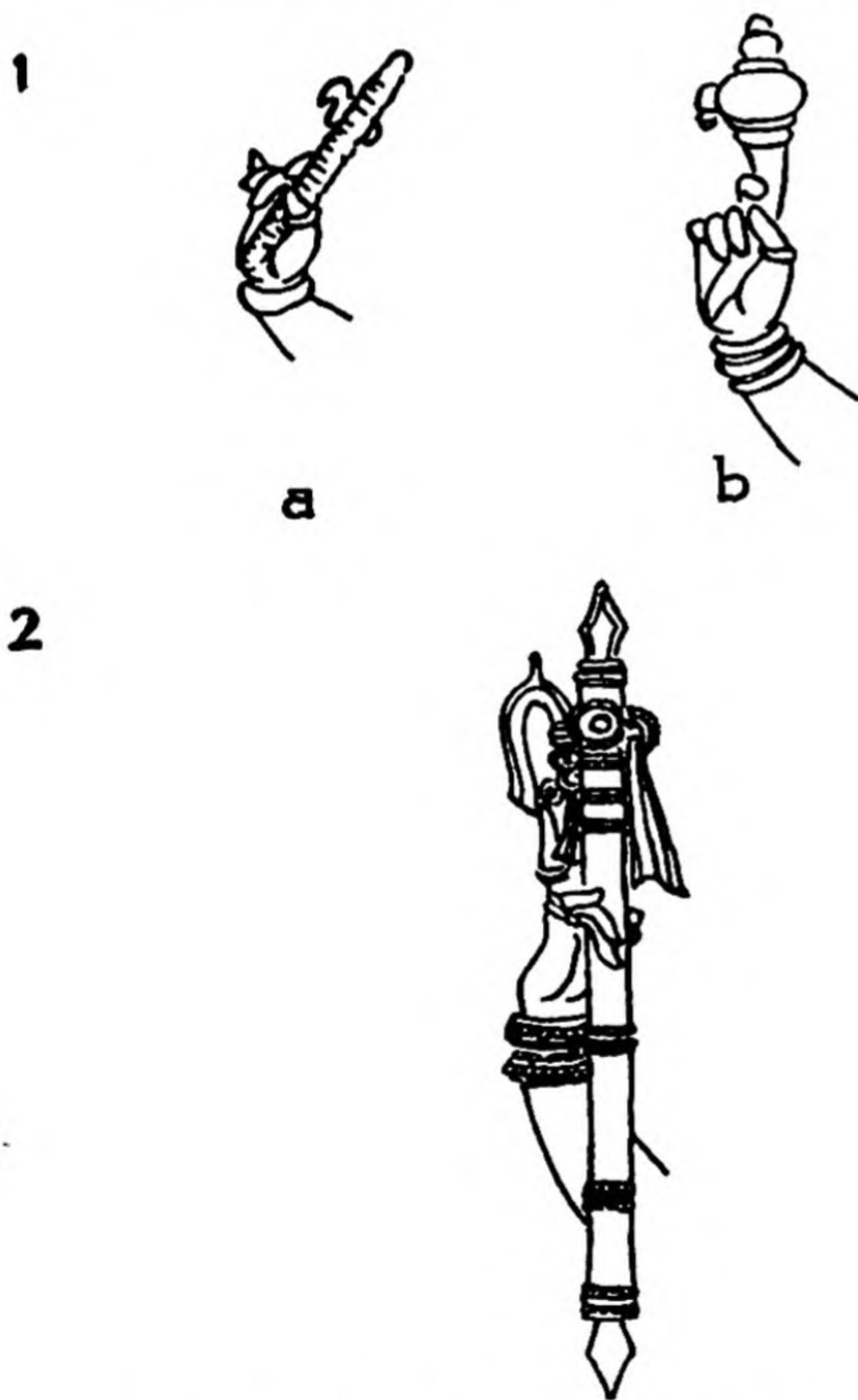


FIG. 23. Forms of aṅkuśa : 1, a, bronze in Madras Museum, b, sculpture from Rāmeśvaram ; 2, sculpture from Halebid

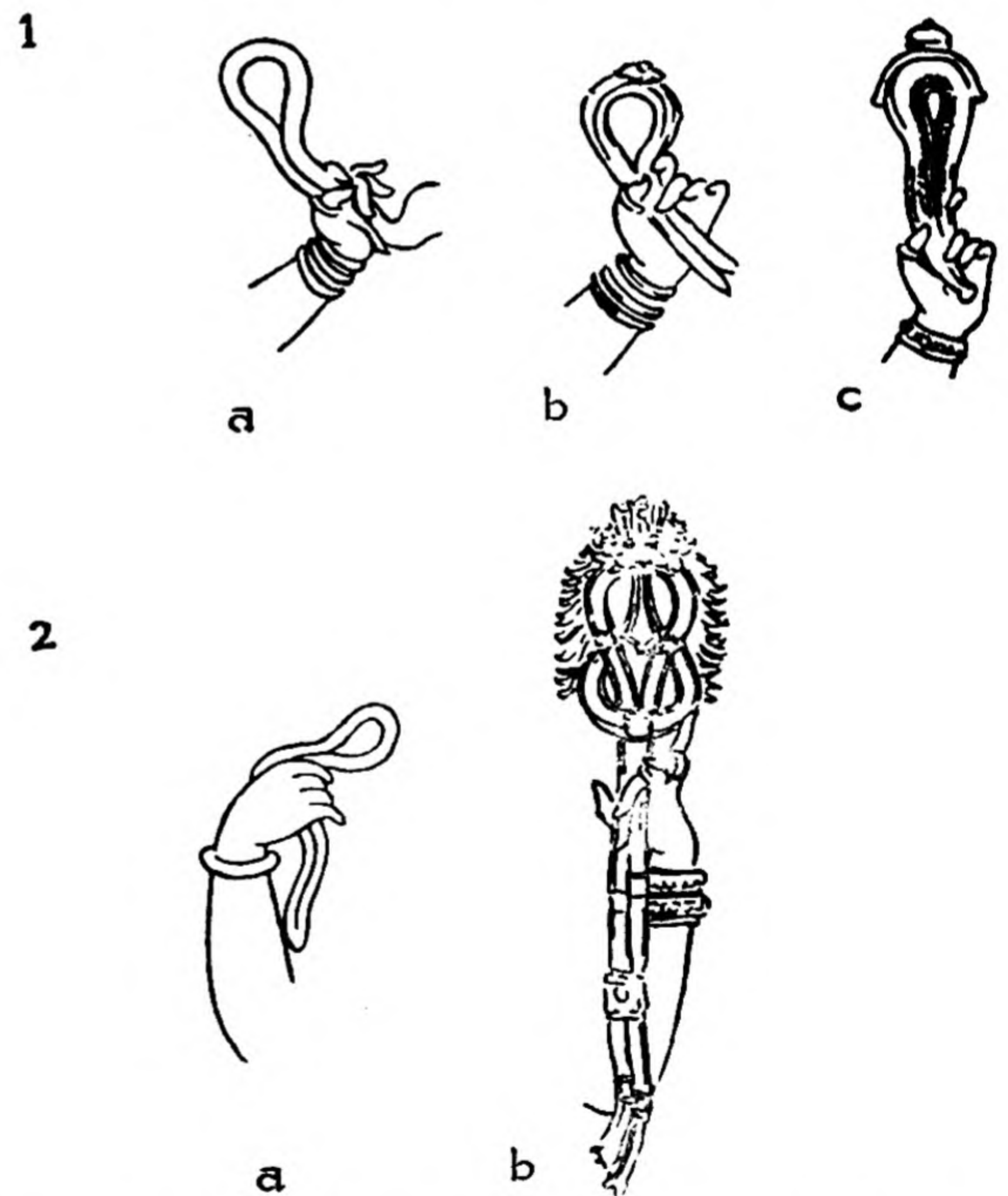


FIG. 24. Forms of pāśa : 1, a-c, bronzes from Tamil area ; 2, a, sculpture from Aihole, b, sculpture from Halebid

While weapons are carried in Pallava and early Chola sculptures in a natural way and the weapons themselves are realistically represented (fig. 22, *a*), in later sculptures they are carried between the first two fingers in the *kartarimukha* pose (fig. 22, *b*) and are conventionalized and deformed beyond recognition. Thus the *aṅkuśa* (goad) and *pāśa* (noose) in early sculptures are true pictures of an elephant-goad (fig. 23; 1 *a* and 2) and a noose mostly a serpent-noose (fig. 24, 1 *a-b* and 2 *a*), but in later sculptures the goad becomes an unrecognizable barrel-shaped object (fig. 23, 1 *b*) and the noose looks anything but what it is intended to be (fig. 24, 1 *c* and 2 *b*). In Chālukyan and Hoysala

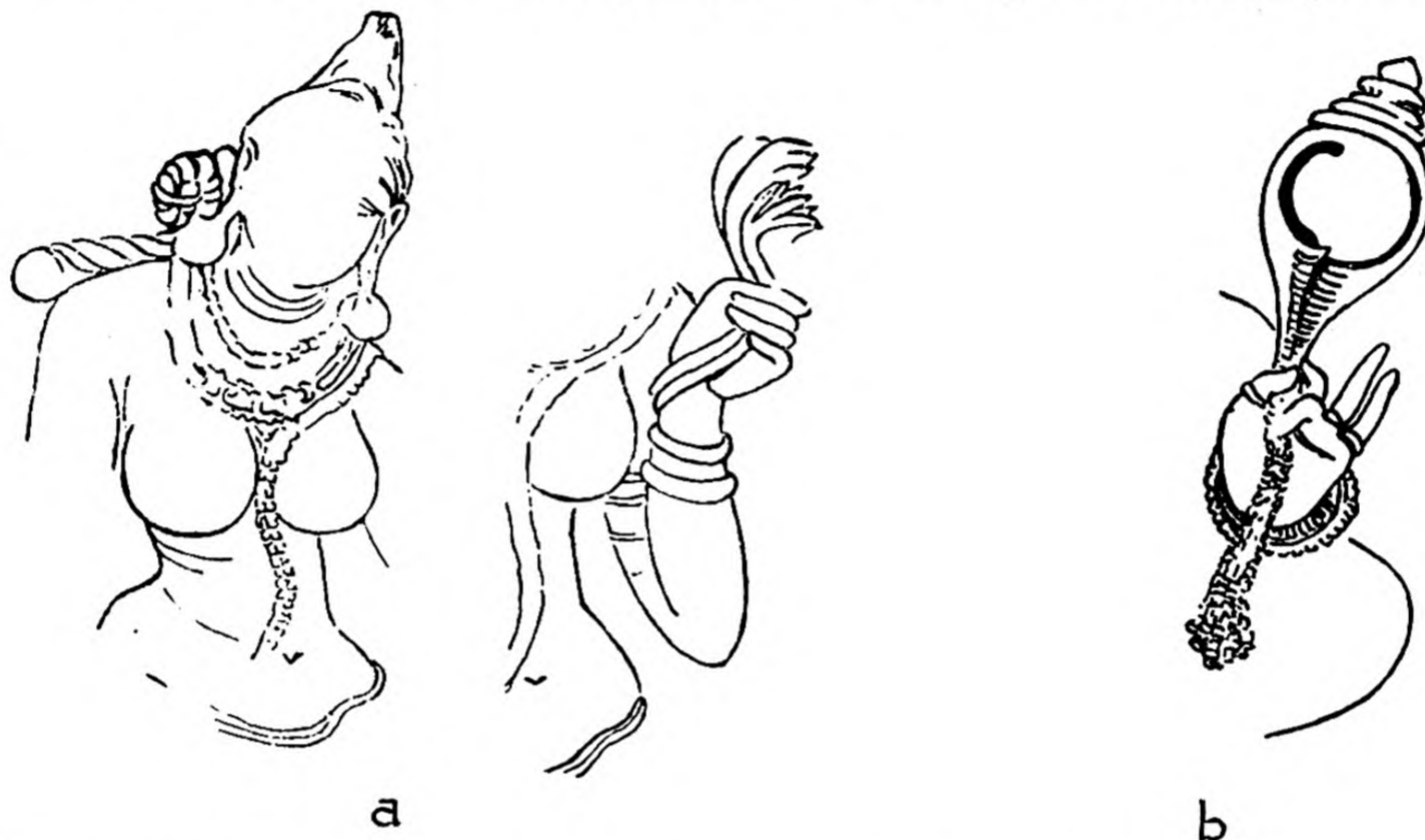


FIG. 25. *a*, lotus held in natural fashion, sculpture from Bijāpur (Madras Museum) ; *b*, conch-shell held in modified tripatāka pose, sculpture from Mysore (Madras Museum)

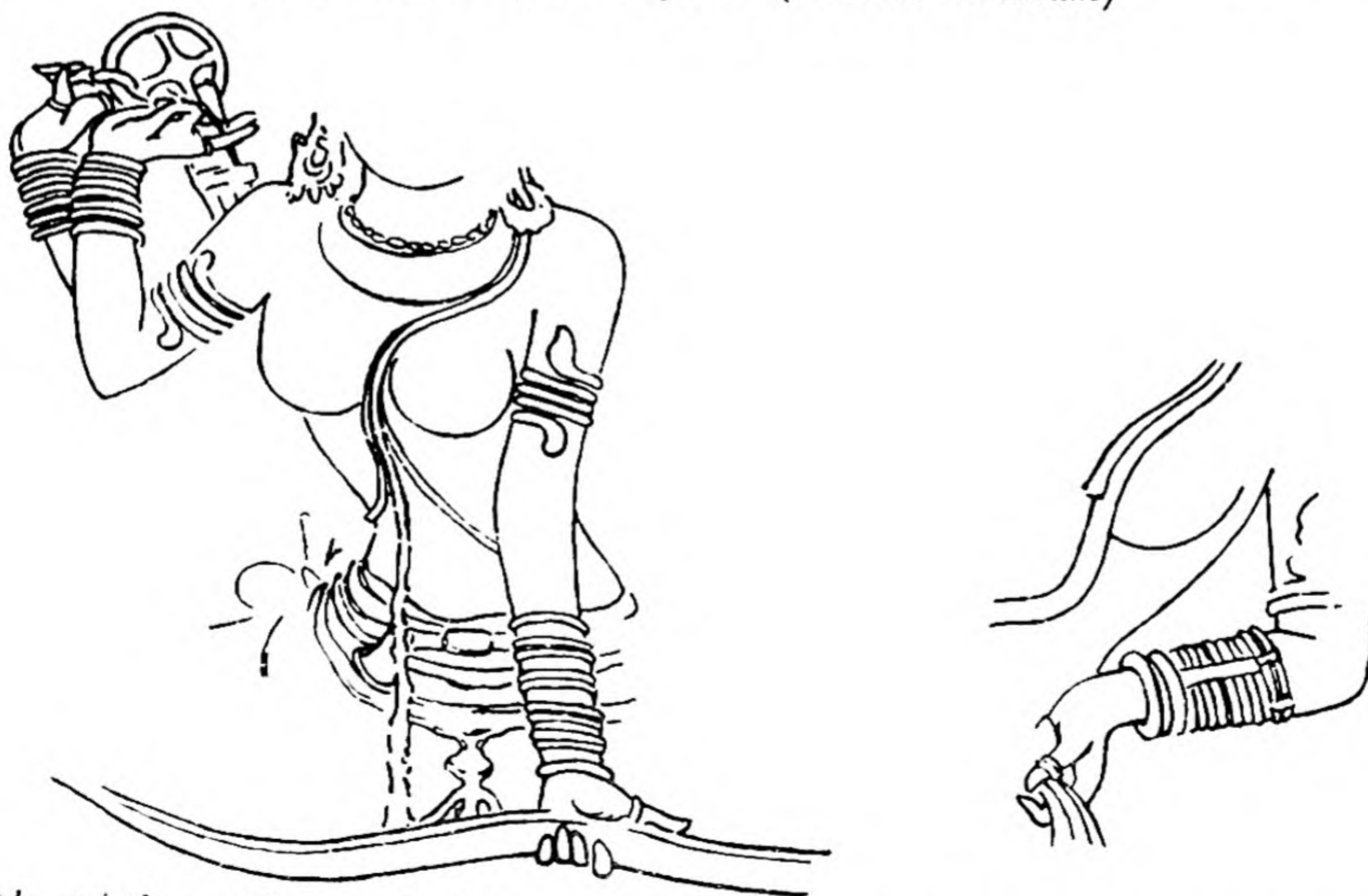


FIG. 26. Multiple wristlets without and with cross-band, sculptures respectively in Madras and Indian Museums

GEOGRAPHICAL AND CHRONOLOGICAL FACTORS

sculptures the weapons that were originally carried in a natural manner in the earliest Western Chālukyan sculptures from Bādāmi, Aihole, etc., come to be carried in a peculiar pose of the hand which looks like a modified form of *tripatāka* (fig. 25, b). This peculiar mode of the hand is found in other late medieval North Indian sculptures as well, as in Gujarat, Rajasthan, central India, Orissa, Uttar Pradesh, Bihar and Bengal and is particularly marked in the upper pair of hands. But in almost all sculptures except those from the Chālukyan area and Gujarat, the decorated and peculiarly-elongated tail-ornament of the weapons is absent. The elongated decorative tail-ends of weapons are one of the chief characteristics of Hoysala sculpture. The decorative pearl-ornamentation and chubby figures are the distinguishing traits of late Chālukyan and Hoysala sculptures which also show the longest and most decorated *yajñopavīta* and *udara-bandha*, beautifully pearl-set necklets, similarly rich crowns, elaborately worked *kaṭisūtra* and wristlets and anklets composed of many rings sometimes united by common cross-bands (fig. 26). Such

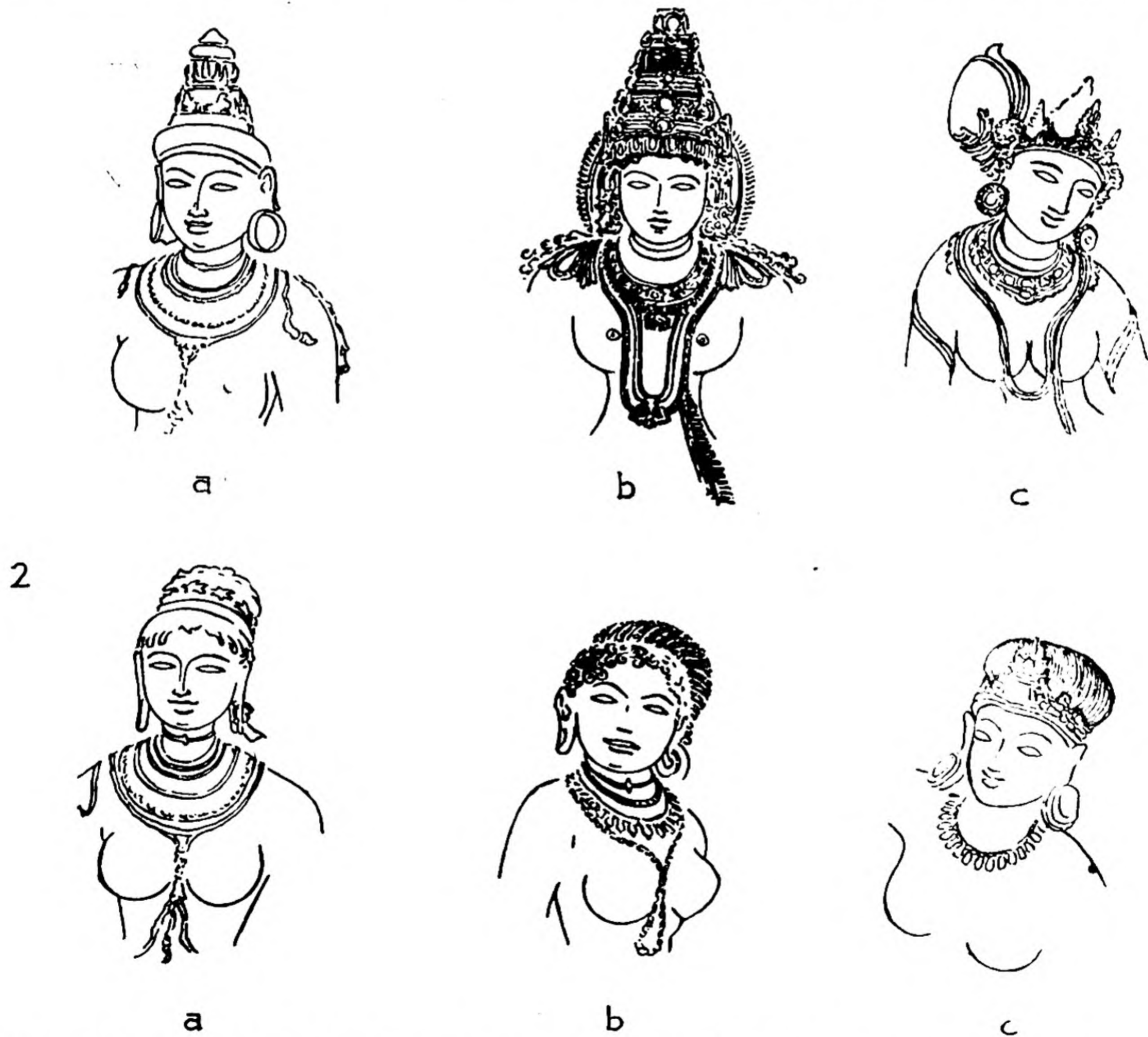


FIG. 27. 1, Forms of mukuta (crown) : a, karanda, bronze in Madras Museum, b, ratna, sculpture from Halebid, c, mukuta-cum-dhammilla, sculpture in Indian Museum ; 2, forms of dhammilla (ornamental coiffure) : a-b, sculptures in Madras Museum, c, sculpture in Indian Museum

profuse ornamentation, absent elsewhere, is as peculiar to the Kanarese districts as the wavy marks of muslin cloth is to the Pāla sculptures of Bengal (above, p. 37). The *karanda-mukuta* is the favourite head-dress for goddesses in the Tamil area (fig. 27, 1 a). In Chālukyan sculptures the crown is a rich and elaborate one (fig. 27, 1 b); a new type of head-dress from Bengal is illustrated in fig. 27, 1 c. The *keśa-bandha* or *dhammilla*, of the same type as in some South Indian images of goddesses like Sītā, Rukmiṇī and Satyabhāmā (fig. 27, 2 a-b), is found in some Bengal representations of goddesses, specially Manasā (fig. 27, 2 c).

VISHNU

Standing figures

In the representation of Vishnu as a *sthāna-mūrti* or standing figure, some of the twentyfour forms are favourite in certain marked areas. The twentyfour forms of Vishṇu may be distinguished according to the disposition of *śaṅkha* (conch), *chakra* (wheel), *gadā* (club) and *padma* (lotus) in the four hands of the deity as described in the *Padma-purāṇa*. The usual form of Vishnu in Tamil districts shows the *chakra* in the upper right hand, *śaṅkha* in the upper left, *gadā* in the lower left and *padma* in the lower right hand. The lower right hand, however, from the earliest images onward shows an *abhaya*, and the lotus is generally shown in that hand. In later sculptures the *padma* is dispensed with. This form of Vishṇu (pl. X A) conforms to the description of Vāsudeva in the *Padma-purāṇa* or of Janārdana in the *Agni-purāṇa* and the *Rūpamandana*. In Hoysala sculptures from Mysore, Keśava figures showing *śaṅkha* in the upper right hand, *chakra* in the upper left, *gadā* in the lower left hand and *padma* in the lower right occur frequently. But in Uttar Pradesh, Bihar and Bengal, the usual Vishṇu is the Trivikrama type carrying *gadā* in upper right hand, *chakra* in the upper left, *śaṅkha* in the lower left hand and *padma* in the lower right (pl. X B).

Though the third eye appears on the forehead of Śiva in sculptures all over the land, there is no such mark on the forehead of Vishṇu as he does not possess the third eye. A *tilaka*-mark, however, may be noticed in the figures of Vishnu in South India from the Vijayanagara period onwards, but this, like all other sectarian marks, is absent before that age. The *nāmam-mark*, or the sectarian Vaishnavite mark, for Vishnu and the triple horizontal stroke for Pidārī (Kālī) and other Śaivaite deities are sure signs of very late workmanship. Occasionally in early South Indian bronze images a costly gem was set in the forehead of Śiva or a golden streak forming *tilaka* was inlaid in the forehead of Vishṇu. But in Bengal and Orissa the *tilaka* of Vishnu, like the third eye of Śiva, is almost always present even in early medieval sculptures.

Seshaśāyin

In the representations of Vishṇu as Śeshaśāyin in the Tamil districts the coils of the snake Śesha are depicted lengthwise (pl. X C) but in the earliest representations of the seventh century at Mahābalipuram (pl. XI B) the coils appear crosswise and are hence shorter, but though crosswise they are coiled like a spring. This crosswise arrangement of the coils, one beside the other, is also a peculiarity of North Indian sculptures, a very early representation, of Gupta workmanship, being seen at Deogarh (pl. XI A). In the Aihole and other early Western Chālukyan sculptures and in medieval sculptures from Rajasthan the same tradition is followed.

Yoga-nārāyaṇa

Vishṇu as Yogesvara or Yoga-nārāyaṇa, with his hands in *dhyāna* posture on his lap, answering to the description of Śiva in meditation given by Kālidāsa in his *Kumārasambhava* (III, 45), like the form of Śiva in *yoga* from Elephanta cave, is the Brāhmaṇical counterpart of similar representations of Dhyāni-Buddhas. Such Yoga-nārāyaṇa has his other two arms carrying his weapons. This form is popular in the Chālukyan area and also occurs in other parts of North India (pl. XII A and B).

Gajendra-moksha

Gajendra-moksha is not a common representation, but there are a few examples for comparative study. The earliest, from Deogarh, of the Gupta period, is a splendid example (pl. XII C). Here the Gajendra incident is shown with certain peculiar changes. The crocodile, popularly known to have caught the leg of the elephant, is absent and a Nāga is shown with its coils tight round the legs of the animal. In later medieval sculptures from Mysore the same theme is represented, but with the crocodile substituted for the Nāga. In Vijayanagara sculptures the popular version of the crocodile occurs. In all these cases Vishṇu is always rushing on Garuḍa to protect the afflicted animal that prayed for his help. In South India this form of Vishṇu is popularly known as Kari-varada ('the boon-giver to the elephant') or simply Varada or Varada-rāja. The famous temple of Varada-rāja in Kāñchīpuram is dedicated to this form of Vishṇu. The right lower hand of Vishṇu is here shown in the *varada* attitude. The representations of Varada-rāja in bronze are identified as such only by the position of the hand, the important feature of the story—the elephant caught by the crocodile that brought Varada to the scene of distress—being absent.

Trivikrama

In an early sculpture at Mahābalipuram (pl. XIII A) Trivikrama is represented with eight arms, with his left leg raised to measure the universe. Jāmbavat is represented above, beating the drum in ecstasy as the *Vaikhānasāgama* requires. Another representation, very similar to this and of comparable date, is that from the Bādāmi caves, and yet another one is from Ellora. But in slightly later medieval forms four hands became more popular. In most representations, whether in North (pl. XIII B) or South India, it is the left leg of the deity that is raised. In the sculptures from the Hoysala temples of Mysore, as from Belūr and Nuggehalli (Hasan District), Trivikrama is correctly represented, in consonance with the *Śilparatna*, as standing on the left leg and with his right leg raised (pl. XIII C). A feature to be noticed in the Hoysala representation is that the weapons of this deity are the same as those of the homonymous deity who is one of the twentyfour forms of Vishṇu. Thus the *gadā* is held in the upper right hand, the *chakra* in the upper left, the *padma* in the lower right hand, and the *śankha* in the lower left. This feature is also present in North Indian sculptures of the time. An excellent example showing similar weapons but with the left (instead of the right) leg raised is a Trivikrama from Bihar, in the Indian Museum, and from Abdullapur, in the Dacca Museum. In other dwarf forms of Vāmana, who is the same as Trivikrama, as in the case of the one from Purāpārā in the Dacca Museum, the same arrangement of weapons is present. This arrangement, essential when identifying Trivikrama among the twentyfour forms of Vishṇu, is however not strictly followed in all representations of Trivikrama with his leg raised; see, for instance, the sculpture from Jorādeul in the Dacca Museum (pl. XIII D).

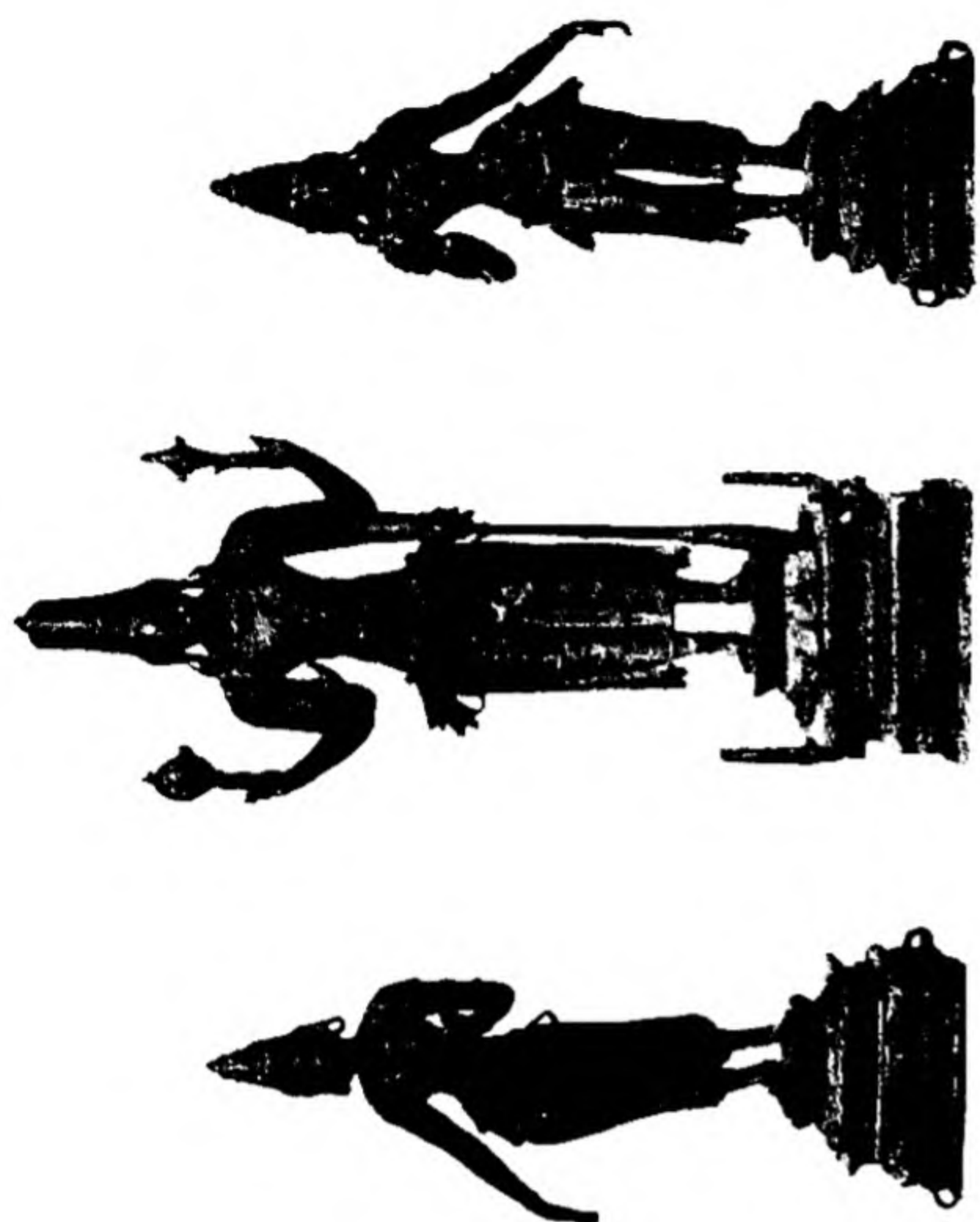
Varāha

The Varāha form of Vishṇu, like that of Narasimha and Trivikrama, was very popular in early medieval days and there are numerous representations all over India. Varāha is invoked at the beginning of many inscriptions of different dynasties. The representation of Varāha in therianthropomorphic form at Udayagiri in Gwalior (pl. XIV B), of Gupta date, is the most famous, and such representations abound all over India, the other classical examples being from one of the Bādāmi caves, from Mahābalipuram (pl. XIV A), from Madhya Pradesh, Rajasthan, Orissa, Bengal and Bihar. Zoomorphic representations of the deity are found side by side with the therianthropomorphic ones but they are confined to the north. The famous boars from Eran, District Jabalpur (pl. XIV C), and in the Gwalior and Lucknow Museums are all examples of the zoomorphic form ; in this form deities representing the whole pantheon are carved all over the body of the animal. The southern limit of this type is Śrīkūrmam (Visākhapatnam District), on the southern border of Orissa. But the normal area for the zoomorphic representation is Uttar Pradesh, central India and the part of Orissa bordering on Madhya Pradesh. Everywhere else it is the therianthropomorphic type that is found. But even where the zoomorphic type occurs, the other and more popular type exists side by side.

Another feature in early representations of Vishnu, especially as Varāha, is that beneath his feet and adoring them is represented Sesha Nāga, therianthropomorphic in form, half-snake and half-man, issuing from the foam of the ocean. This is noticed at Udayagiri in Gwalior, at Bādāmi, at Mahābalipuram, at Rājim in Madhya Pradesh and other places. It is interesting to note that in the representation of Trivikrama from Rājim, Śesha Nāga is shown near the right foot of Vishṇu, a feature which occurs in early sculptures and, being unusual in later ones, helps in dating. It may be noted that the Nāga-element in the Varāha-Trivikrama forms is to indicate the Pātāla-loka, one of the three worlds covered by Trivikrama. This early device of depicting Pātāla may also be seen even on the reverse of the coins of Yajña Śātakarṇī and the Western Kshatrapas (second-third centuries).

Narasimha

In South India Narasimha is very popular, the early representations being of Pallava date. Narasimha is represented in large numbers in different ways in Tamil and Chālukyan sculptures—Narasimha in action and Narasimha in repose, Narasimha in meditation and Lakshmī-narasimha with his spouse—all forms are popular in South India. He is differently known as Sthaṇa-narasimha when depicted in the action of tearing out the entrails of Hiranyakaśipu, as Yoga-narasimha when seated in meditation (with either the full *yoga-paṭṭa* or the *ardhayoga-paṭṭa* bound round his legs like the *paryāṅka-granthi-bandha* of Dakṣiṇā-mūrti Śiva), as Kevala-narasimha when standing alone (a fine example of which comes from the Bādāmi cave) and as Lakshmī-narasimha where there is Lakshmī on his lap. A magnificent example, though of later date, is the mutilated sculpture from Hampi. In early medieval representation of Narasimha in the Deccan and South India the lion-face is natural (fig. 28, 1 a), but later, all over India, it is stylized (fig. 28, 1 b, 2 a-b and 3 a-b). In all North Indian sculptures of Narasimha, whether from central India or from Uttar Pradesh, Bihar, Bengal or Orissa, Narasimha is represented as dancing with his left leg slightly raised and bent in what is known in Buddhist iconographic parlance as *ardha-paryāṅka*, and he is represented as tearing the stomach and pulling



A. Vishnu as Vāsudeva with consorts from Peruntottam, Tanjore
(Madras Museum)



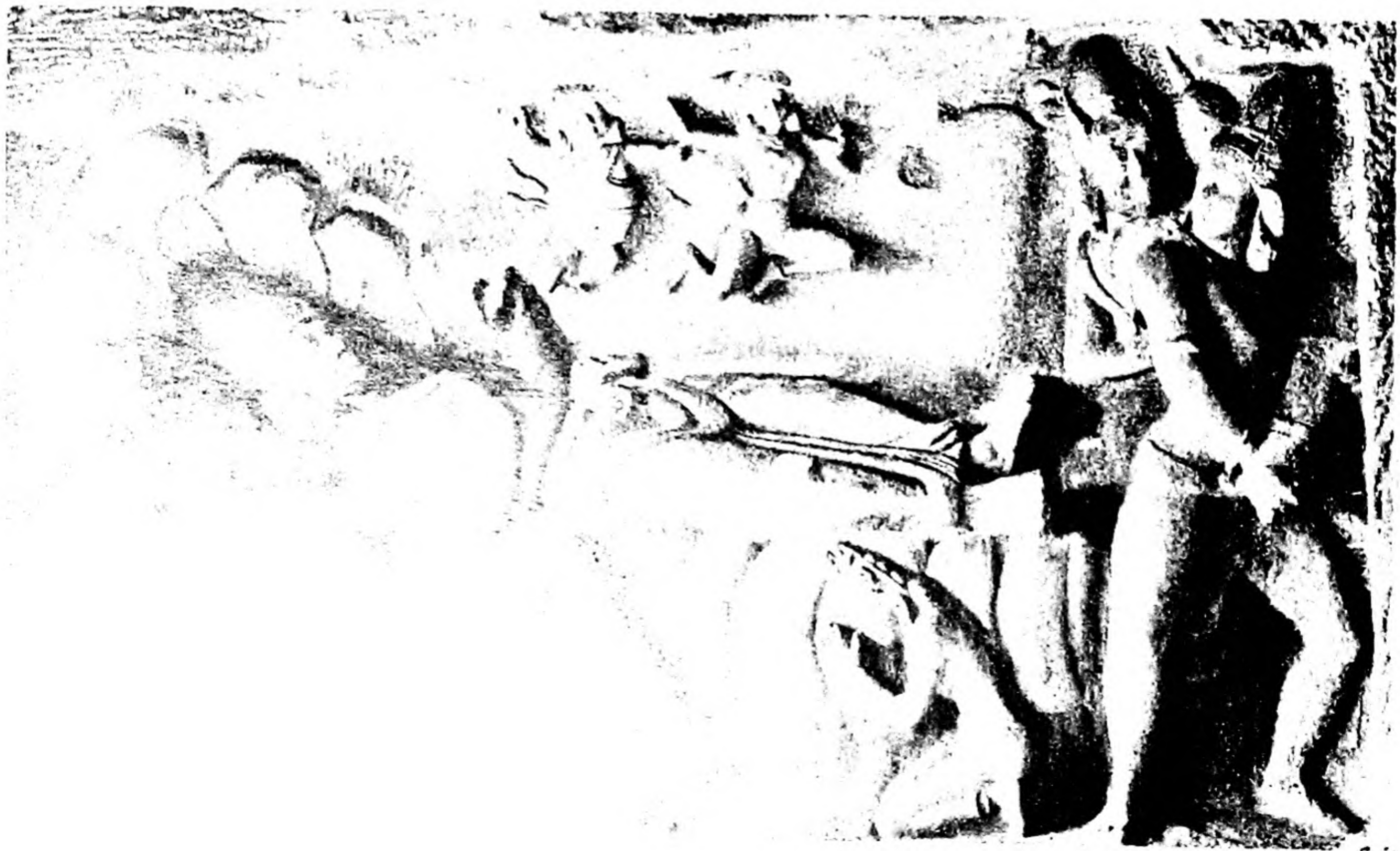
C. Seshasāyīn, from Hampi, Bellary



B. Vishnu as Trivikrama with consorts,
from Sundarbanas, 24 Parganas
(Indian Museum)



A



Deoga ... Mahābalipuram, Chingleput



A



B

Yoganārāyaṇa: A, from Mathurā (Mathurā Museum): B, from Hucinahadaballi, Bellary



C, Gunderachahalli, Bellary



A



C



B



D

Reliefs from the Gupta period: B, from Rājīm, Raipur; C, from Nugehalli, D, from Jagādal, Dacca (Dacca Museum)



A

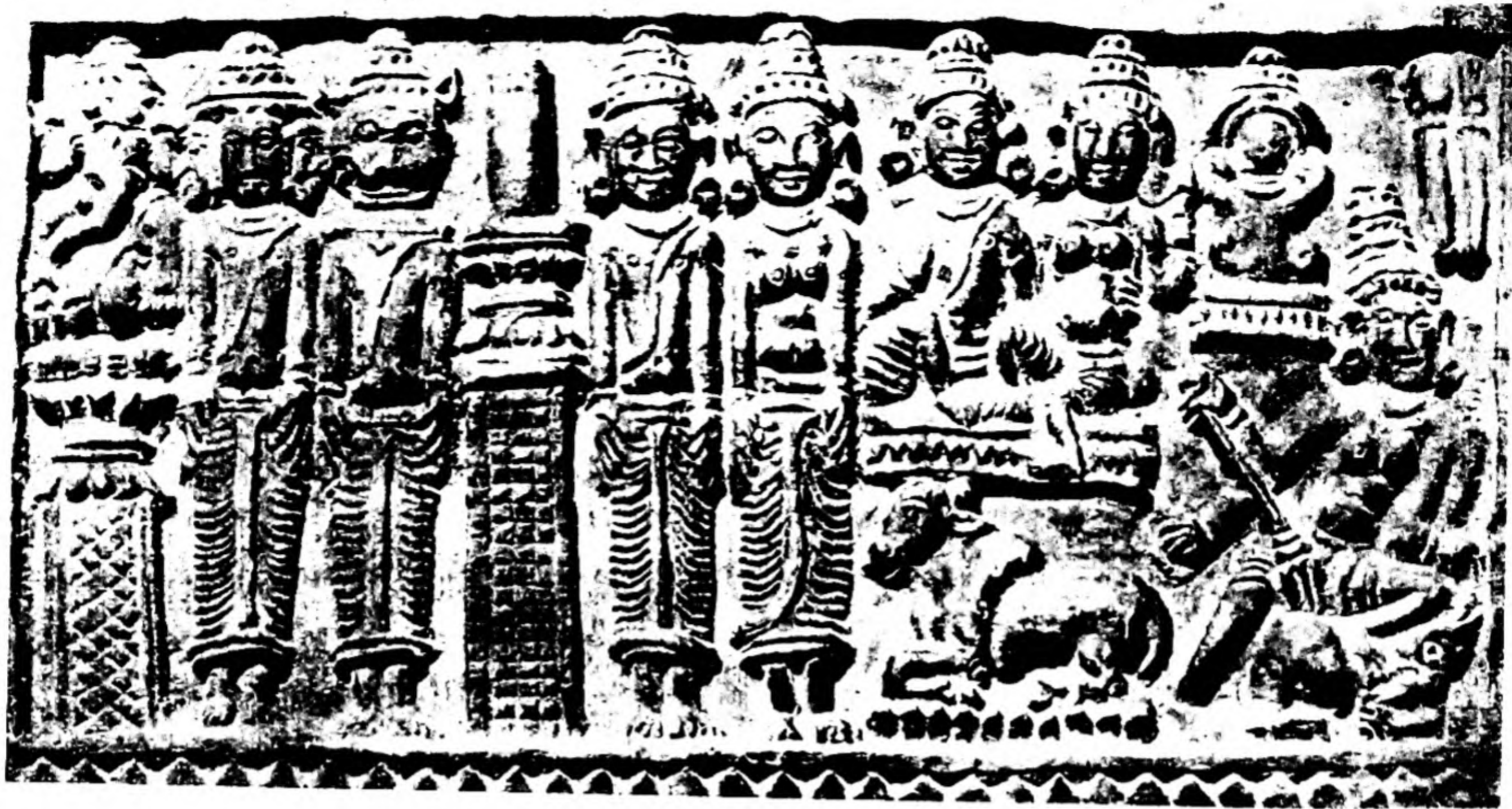


B



C

Varāha: A (therianthropomorphic), from Mahābalipuram, Chingleput; B (same), from Udayagiri, Gwalior; C (zoomorphic), from Eran, Sāgar



A



Srīvatī
from Ma



C

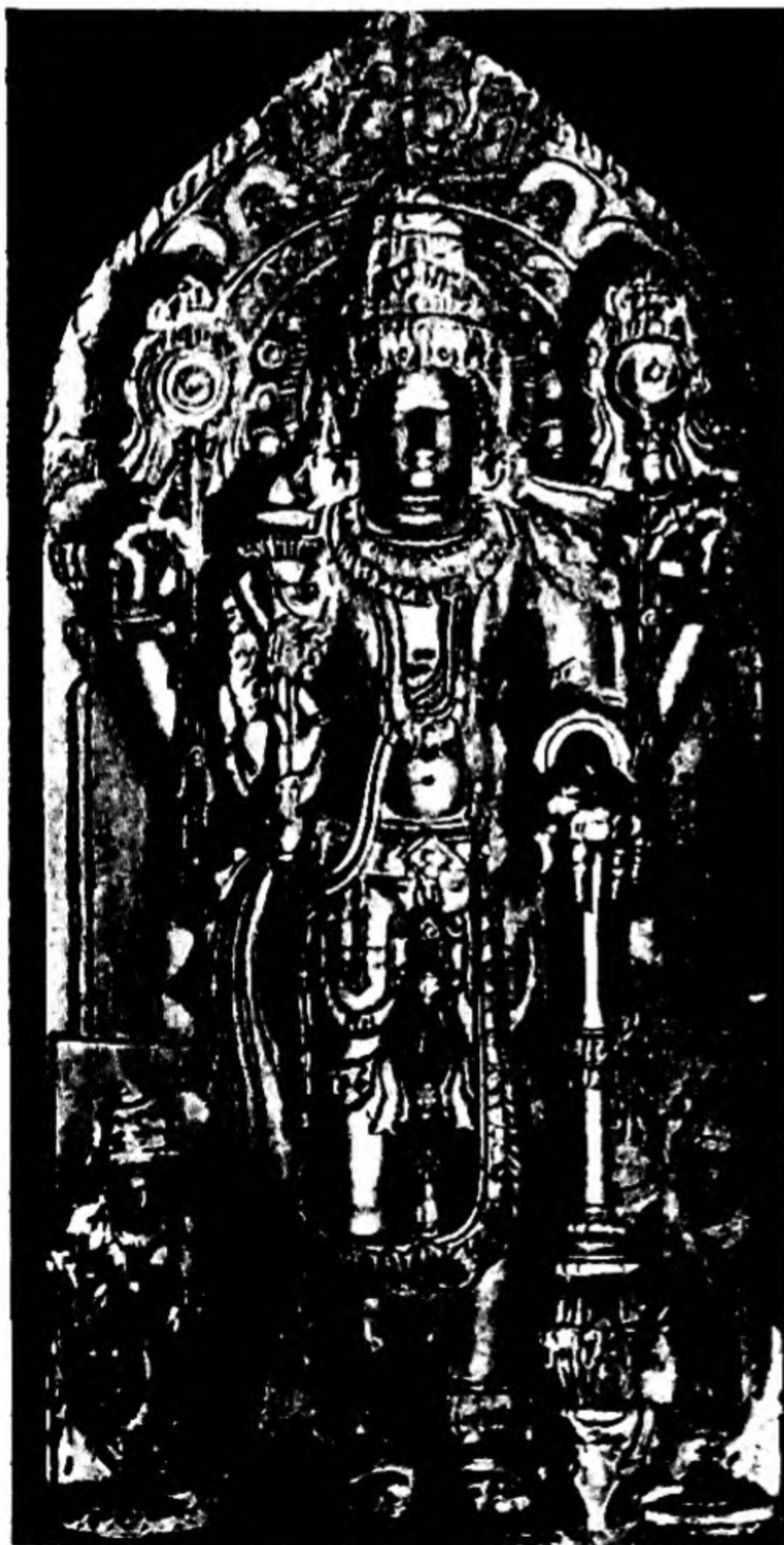
(Plate from Madras Museum); B, on chest of Tīrthaṅkara,
C, carved about on chest of Tīrthaṅkara, from Bāṅkurā
(Madras Museum)



A



B

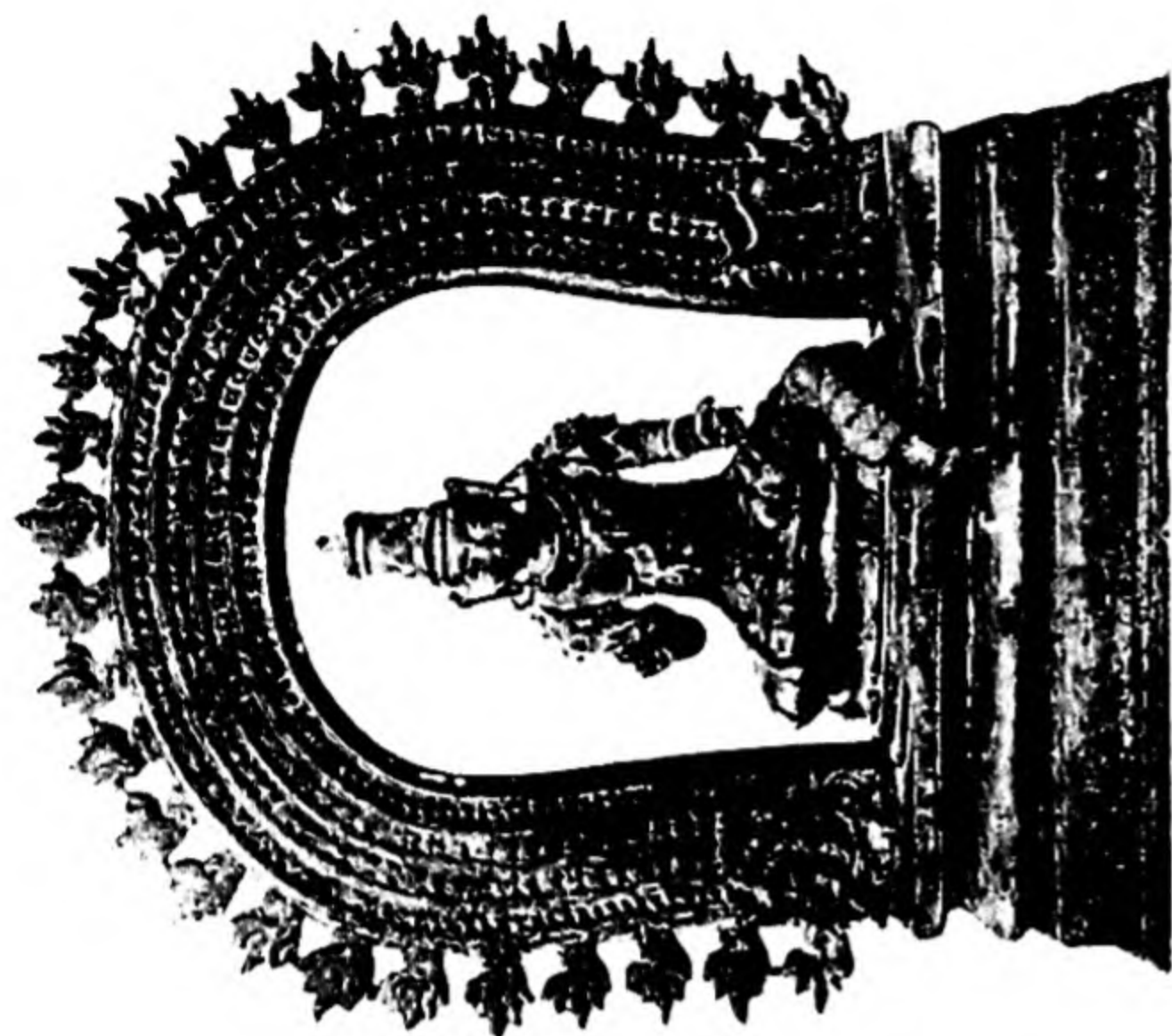


C

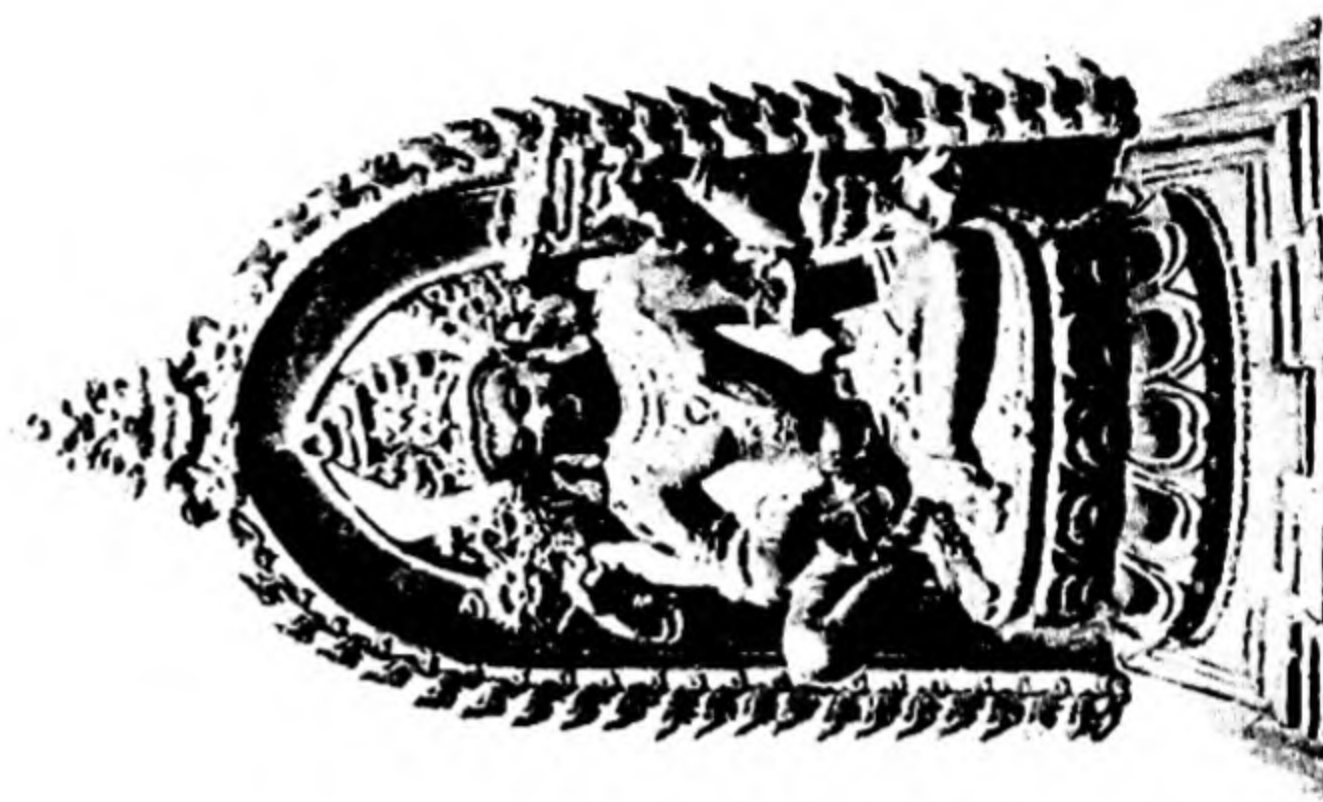


D

Śrīvatsa mark: A, mark absent on chest of Vishṇu (Madras Museum); B, mark present on chest of Vishṇu, from Komal, Tanjore (Madras Museum); C, mark absent on chest of Vishṇu as Janārdana, from Somnāthpur, Mysore; D, on chest of Tirthaṅkara, from Karanbel, Jabalpur



A



C



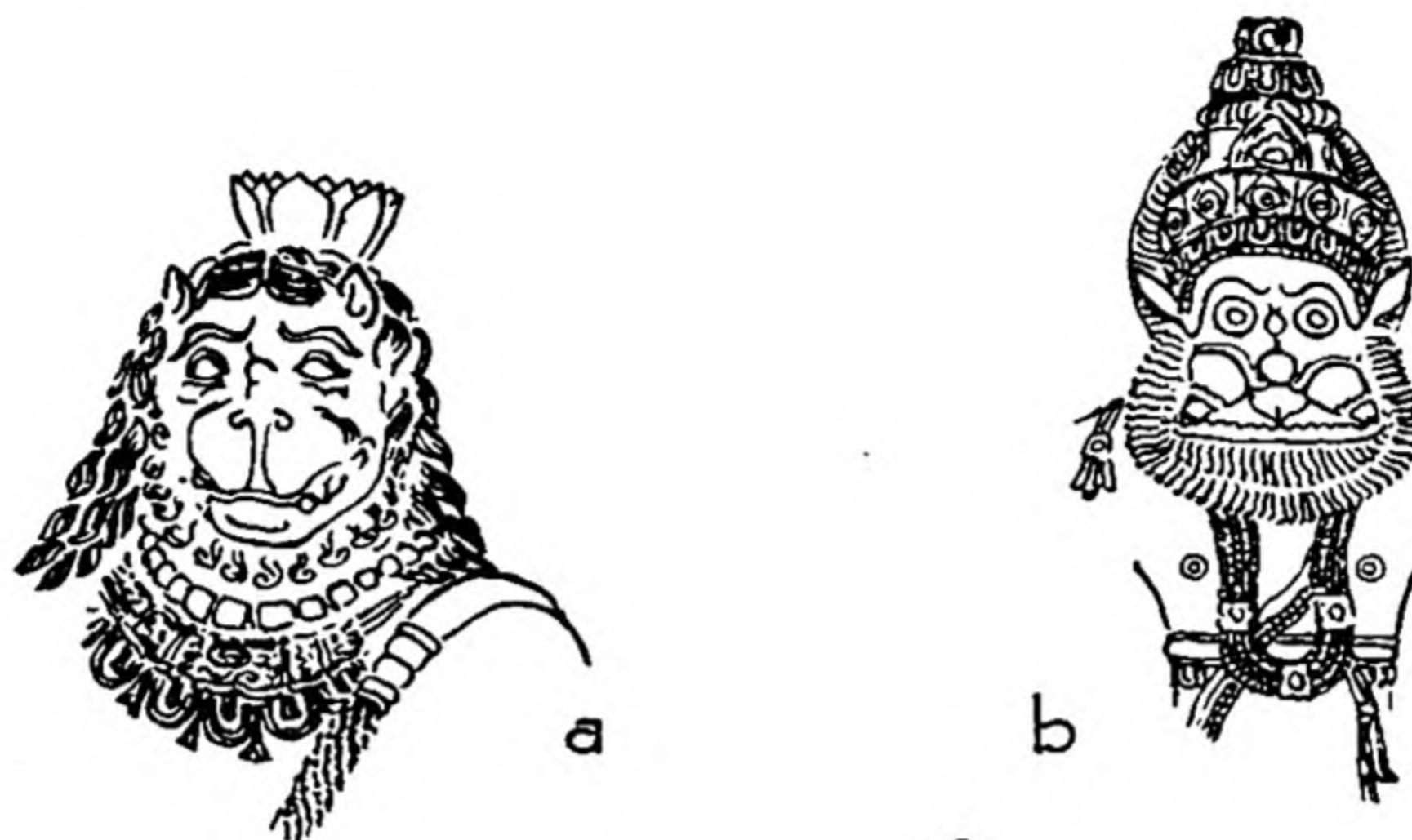
B

A and B, *Vaijayanī-māla* of Vishnu, respectively from Komal, Tanjore (Madras Museum) and Bengal (Indian Museum); C, *gadā and saṅkha in Hṛishikeśa*, from Śāgardīghī, Mūrshidābād (Vaiṅīya Sāhitya Parishad Museum)

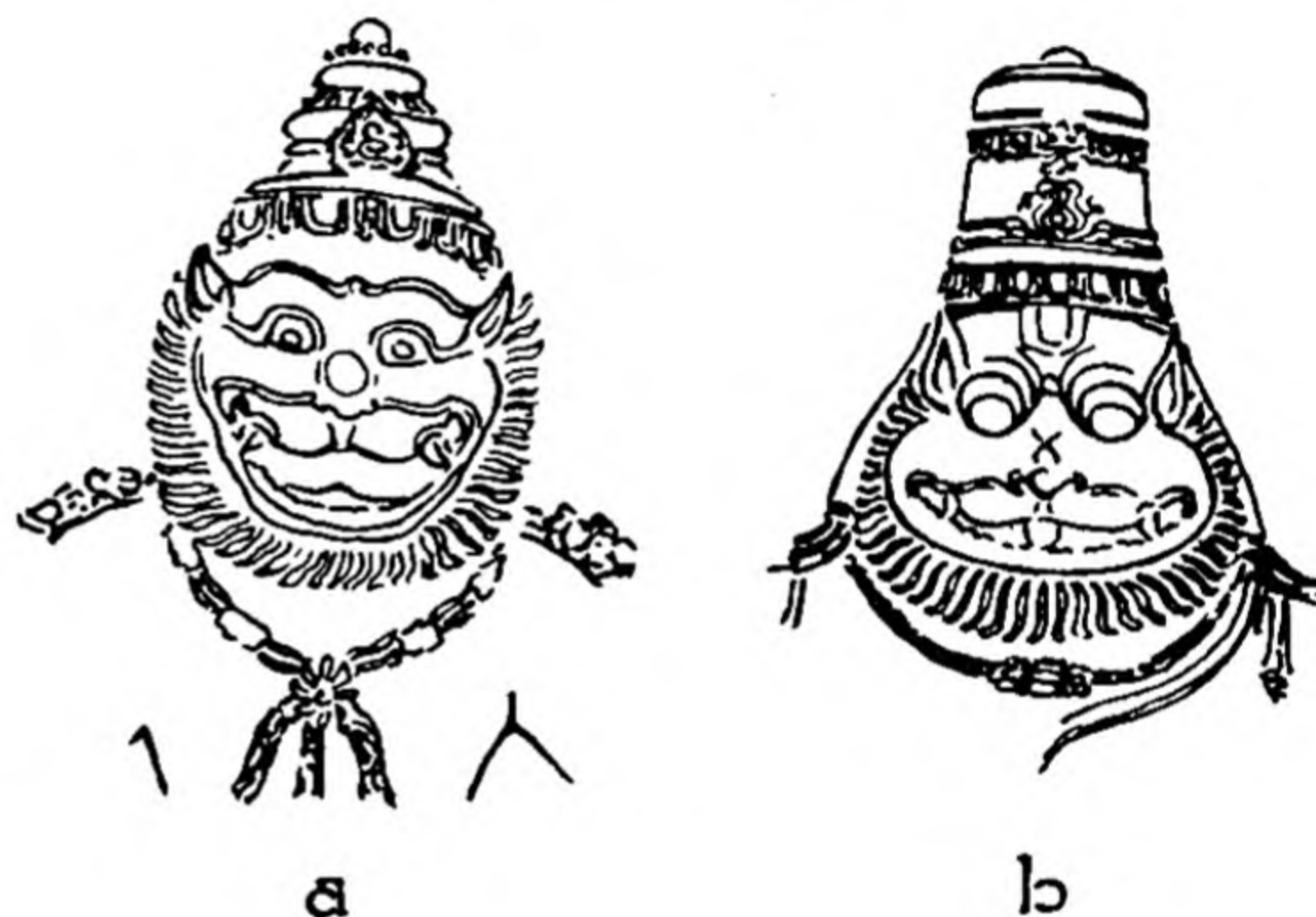
GEOGRAPHICAL AND CHRONOLOGICAL FACTORS

out the entrails of Hiranyakaśipu. This is the *sthauna* form of Narasimha and is the only one known in these parts.

1



2



3

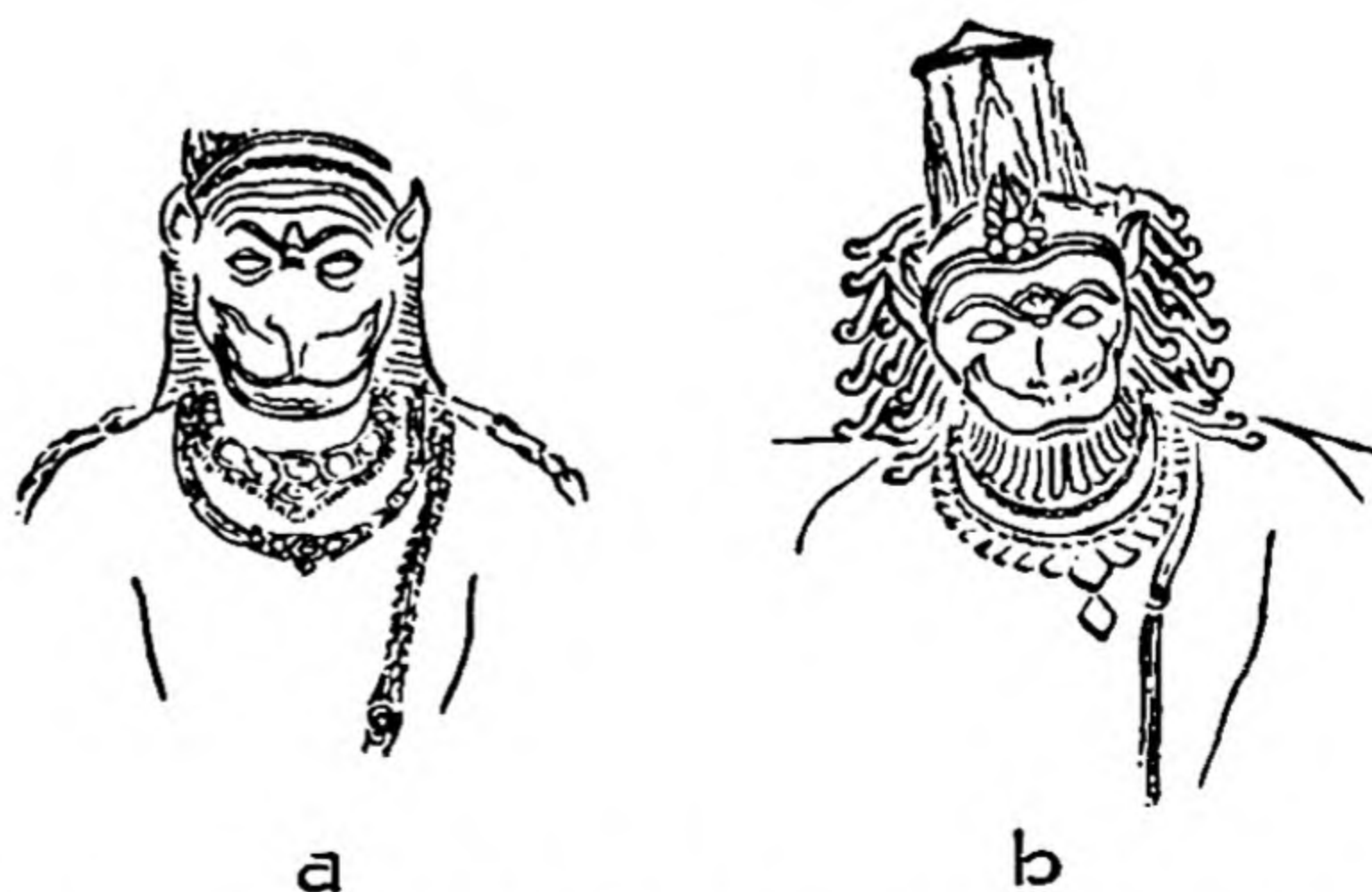


FIG. 28. *Forms of Narasimha* : 1, a, from Bādāmi, b, from Bellary ; 2, a, bronze in Madras Museum, b, sculpture from Hampi ; 3, a, sculpture in Indian Museum, b, sculpture in Rājshāhī Museum

The śrīvatsa symbol

On the chest of representations of Vishṇu appears a mark which is known as the *śrīvatsa*, a very ancient symbol. *Śrīvatsa* the mark, *kaustubha* the gem, and *vaijayantī-mālā* the garland of flowers—these three are special decorations of Viṣṇu. The *śrīvatsa* distinguishes Viṣṇu as one possessing a special mark of beauty and fortune—*śrīvatsa* being the symbol of the goddess of fortune, Śrī,—and as Purushottama, the most illustrious one. This mark, peculiar to Viṣṇu in medieval sculptures, is, however, lacking in most of the Gupta representations, though the symbol is associated with Viṣṇu even in early

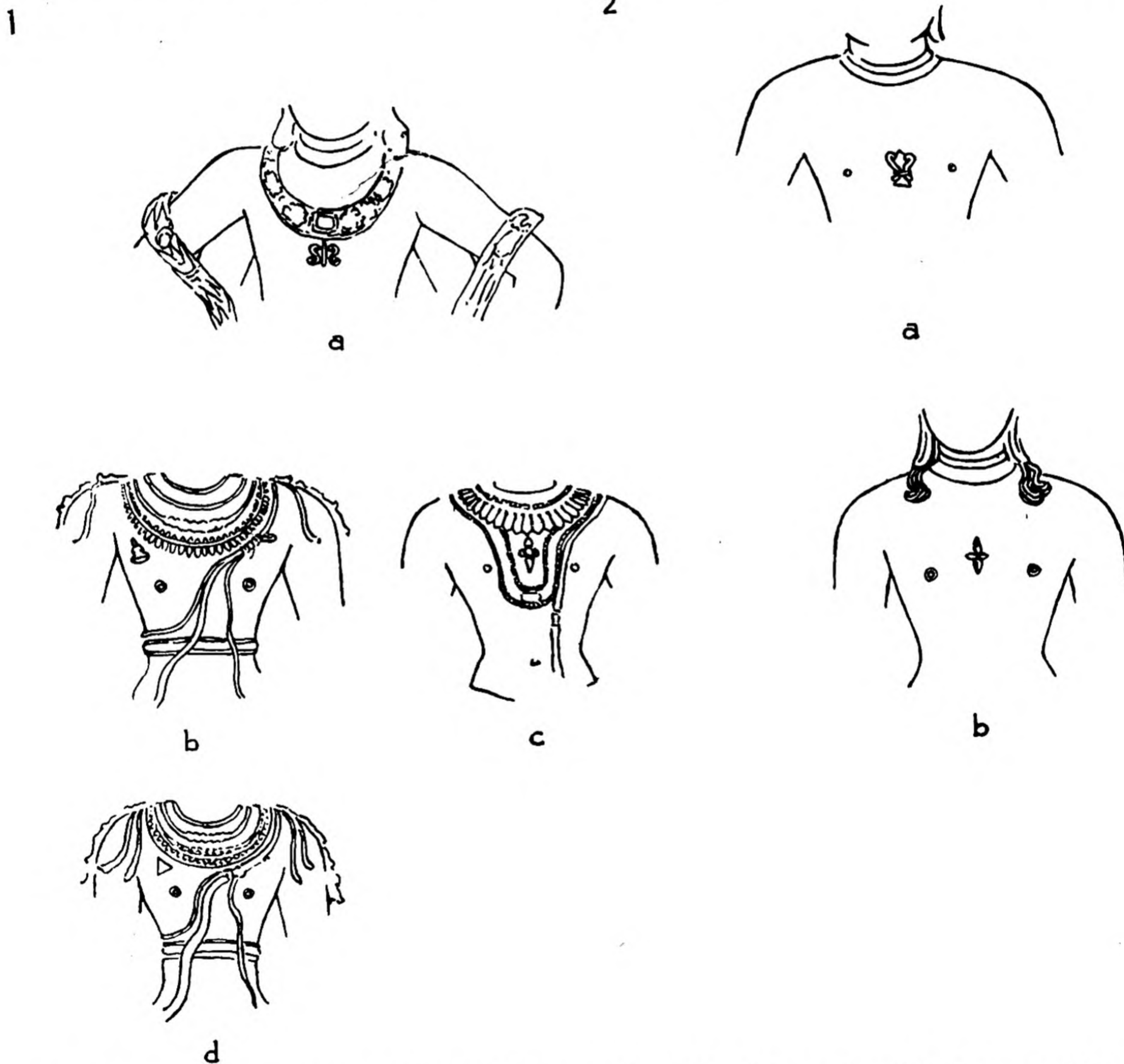


FIG. 29. Forms of *śrīvatsa* : 1, on the chest of Viṣṇu, a, from Udayagiri cave, b and d, bronzes in Madras Museum, c, sculpture from U.P. ; 2, on the chest of Tirthaṅkara, a, from Mathurā, b, from Karanbel

literature. It occurs as a mark of *mahāpurusha* ('a great person') on the chest of the Jaina Tīrthaṅkaras in Kushan sculptures from Mathurā (fig. 29, 2 a). Though other auspicious marks are found on the body of Buddha, the *śrīvatsa* mark is absent from his chest owing to the fact that it is covered by a cloak ; but it occurs freely in Buddhist sculptures in different contexts.

The symbol has undergone a change in shape during the centuries.¹ The earliest type is either a vertical line with an S-shaped curve to the left and a symmetrical curve to the right or a vertical line cutting two crescents at its base and at its middle (fig. 29, 1 a). In the medieval sculptures of North India, especially Uttar Pradesh, it changes into a lozenge-shaped four-petalled flower, the side-petals shorter and broader and the top and bottom ones slightly longer (fig. 29, 1 c). In South India the early specimens have exactly the same shape as in Kushan sculptures, as is frequently seen in Amarāvati sculptures. In the Pallava period the symbol still retains its early shape and a small bronze from Enādi (Tanjore District), preserved in the Madras Museum, indicates the association of the symbol with a seated Lakshmi. The curled hands and legs and the crowned head and trunk suggest a semi-symbolic figure of seated Lakshmi. This symbol, which should normally be expected in the earliest Pallava sculptures in South India as adorning the chest of Vishṇu, is actually absent there (pl. XVI A); the larger and imposing sculptures from Mahābalipuram, Kīlmāvilangai (Chingleput District) and elsewhere lack it.

The Madras Museum collection of bronzes from South India contains some figures representing Vishṇu which are specially important for the study of the evolution of the *śrīvatsa*-mark in South India. The mark as found on the chest of the earlier ones approaches the early symbol to a certain extent and is still suggestive of the origin (fig. 29, 1 b), but there is also the tendency for the symbol to become triangular in form, in which shape it is finally seen in the Vijayanagara period² (fig. 29, 1 d). In early Chōla bronzes, such as the Vishṇu with Śrī and Bhūdevī (no. 1 from Peruntottam, Tanjore District) and Vishṇu as Śrīnivāsa, also with Śrī and Bhūdevī (no. 2 from Vāḍakkupaniyūr), the *śrīvatsa* symbol is nearer the earlier symbol, of which the semi-symbolic Lakshmi referred to above is a close parallel and derivative. In late Chōla bronzes, like Varadarāja no. 1 with Śrī and Bhūdevī from Tiruppuvanam, Vishṇu no. 7 from Paṇḍarāvāḍai, Vishṇu no. 10 from Komal (all in Tanjore District), and Vishṇu as Vaikunṭhanātha, again with Śrī and Bhūdevī, from Polagam (Tanjore District), this mark is clearer still. In the case of Varadarāja no. 1 from Tiruppuvanam the mark is somewhat like a vertically elongate rectangle with conical top, suggesting a shrine for Śrī, but in Vishṇu no. 10 from Komal, showing seated Lakshmi, the representation of the mark is the clearest, the figure composing a triangle (pl. XVI B). In the Vijayanagara bronzes of Vishṇu, as Śrīnivāsa no. 4 with Śrī and Bhūdevī, the triangle represents the *śrīvatsa*-mark, and this is the last phase in the development of the symbol in South India, as henceforth the symbol is represented only by a triangle. A representation of the late Chōla phase of the *śrīvatsa* development may be seen in the seated triangular image of Lakshmi on the chest of the green monolithic sculpture representing Vishṇu as Sayana-mūrti near a tank at lower Tirupati (Chittoor District), where a number of such sculptures carved of the same fine-grained stone of pleasing colour are arranged around the margin.

But the presence of the early type of *śrīvatsa*-symbol as a semi-symbolic seated Lakshmi in the late Pallava bronze already referred to above is not a solitary instance.

¹ C. Sivaramamurti, 'Goddess Lakshmi and her symbols', *Journal of U.P. Historical Society*, XIV (1941), pp. 21-24.

² F. H. Gravely and T. N. Ramachandran, *Catalogue of South Indian Hindu Metal Images in the Madras Government Museum* (Madras, 1932), p. 28.

It has a history behind it. The absence of the *śrīvatsa* mark on the chest of Vishṇu in the sculpture at Mahābalipuram does not prove anything particular. Here it is only another instance of the similarity between early Eastern Chālukyan and early Pallava sculpture, seen not only in the lack of *śrīvatsa*-mark on the chest of Vishṇu, but in the heaviness of the limbs, the thick roll-like *yajñopavīta* going over the right arm and the weapons being held in a natural way. This absence of the mark on Vishṇu's chest in Western Chālukyan sculptures (pl. XVI C) follows the earlier Gupta tradition.

Among the ancient finds in Peddamuḍiyam (Cuddapah District), there are some archaic sculptures that suggest a pre-Pallava date. The deities here represented are among the earliest known to South Indian Hindu iconography as also the most popular at that time. Ganesa occurs here with only a single pair of arms as also Brahmā, Narasimha, Vishṇu and Devī. Both Śivaliṅga and Somāskanda with the bull occur here. Śrī or Lakshmī appears in her semi-symbolic form, as also Mahishamardini. The *śrīvatsa* symbol here explains the origin of the later Pallava figure and constitutes the link between the symbol as it is represented in late Amarāvati and in Pallava sculptures (pl. XV A).

Strangely enough, the Gupta tradition seems to have ignored this symbol altogether, and the chest of Vishṇu is almost always shown bare, though there are rare instances, as the one from Udayagiri, of Gupta Vishṇu with this mark (pl. XVIII D). This tradition is followed in Chālukyan and Hoysala sculptures (pl. XVI C), but in Madhya Pradesh, though the mark is absent in the earlier medieval sculpture such as the figure of Trivikrama from Rājim (Raipur District) (pl. XIII B), it is found in later sculptures like the Haihaya carvings from Tripurī and in the Śeṣhaśāyin from Sohāgpur. In Madhya Pradesh, medieval sculpture is characterized by the presence of the four-petalled, vertically elongate variety of the mark on Vishṇu's chest. Generally the mark is distinct but sometimes there is a tendency for it to appear like a pendant to the lowest necklet. It may here be remarked that while the *śrīvatsa*-mark is on the right chest of Vishṇu, as it correctly ought to be, in South Indian medieval sculptures, it is exactly at the centre of the chest in North Indian ones and thus naturally tends to fuse with the necklets and with the *kaustubha*-decoration.

In Bengal the Gupta tradition persists and the *śrīvatsa* is generally absent from Vishṇu's chest, the exceptions being the bronze image from Kumārpur (Rājshāhī District), the Varāha from the temple at Rānihātī and the Narasimha from Tāngibārī (both in Dacca District). Though the *śrīvatsa*-mark is thus very rare, the *kaustubha*, as a pendant from the necklet, is sometimes found. This pendant is shaped more or less like a cross consisting of four petals, the lower one rectangular with corners pointing to the cardinal points as in the *śrīvatsa*. This marks the fusion of the *śrīvatsa* with the *kaustubha*. Occasionally, as in the Vishṇu figure from Sāgardīghī (Mūrshidābād District), the pendant is circular. Following this tradition, Tīrthaṅkara images of the medieval period in Bengal lack the *śrīvatsa* mark on the chest, though elsewhere in North India it is present both in Tīrthaṅkara (fig. 29, 2 b) and in Vishṇu images (fig. 29, 1 c). In South India, medieval sculptures of Vishṇu have the mark, though the Tīrthaṅkaras lack it.

To sum up, while the mark is present on the chest of Tīrthaṅkaras in very early North Indian sculptures (pl. XV B), it is generally absent from that of Vishṇu, and, while it is present on the chest of Vishṇu in South Indian Tamil medieval sculpture, it is absent there from the chest of the Tīrthaṅkara. It is present in North Indian medieval sculptures (pl. XVI D) except in Bengal, where it is occasionally present on the chest of Vishṇu but never on that of the Tīrthaṅkara (pl. XV C).

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Other attributes of Vishnu

Vaijayanti-mālā. The *vaijayanti-mālā* is another decoration special to Vishnu very prominent in northern, central and eastern sculptures (pl. XVII B). It is a long garland full of decorative work encircling the back of the figure and running inward from over both the arms, to trail like an *uttariya* with both ends joined. Though this is an essential decorative feature of Vishnu in sculptures north of the Deccan, it is usually absent in

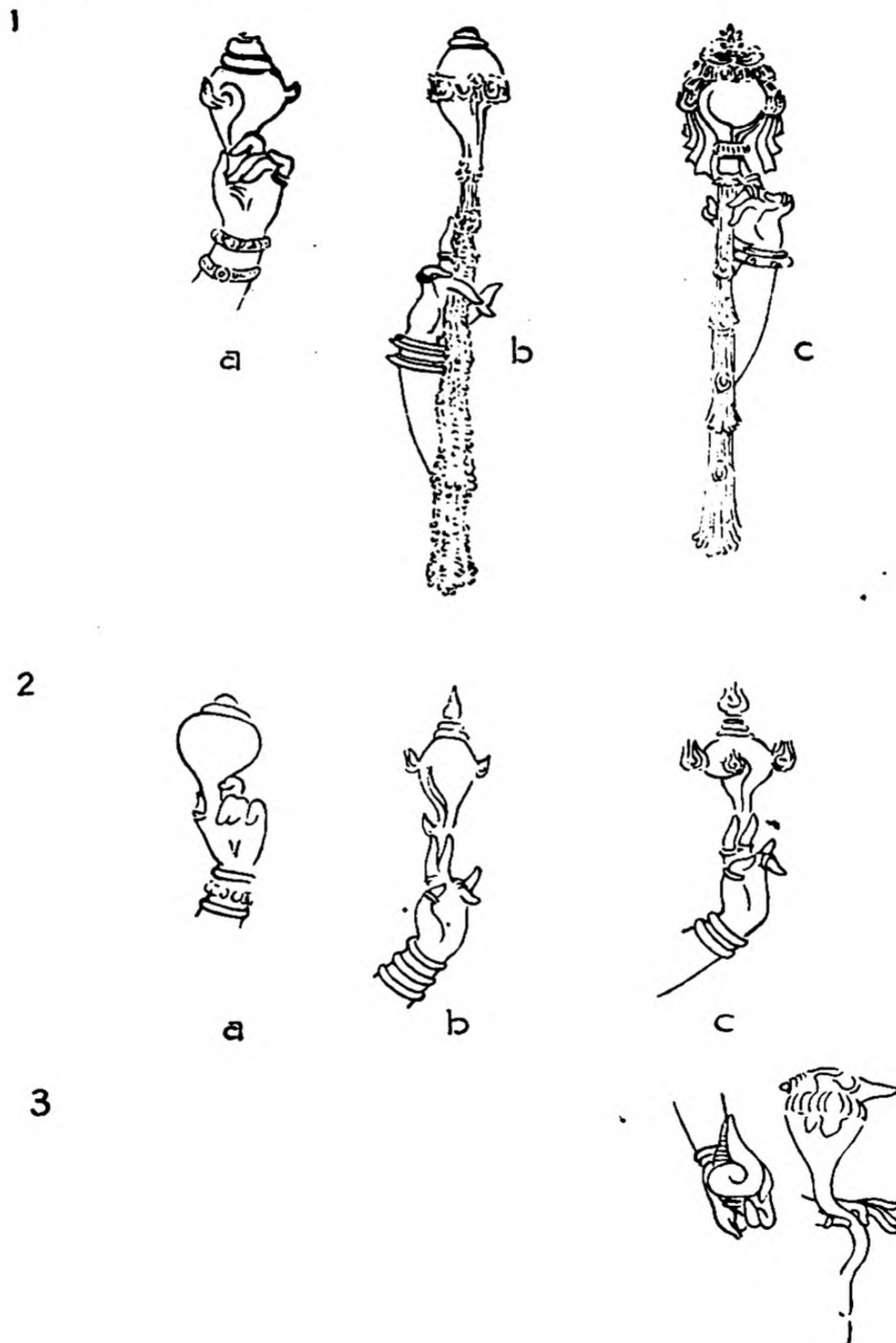


FIG. 30. Attributes of Vishnu—conch : 1, Chālukyan tradition, a, from Bādāmi b, from Bāgalī, c, from Belūr ; 2, Tamil tradition, a, from Mahābalipuram, b and c, bronzes in Madras Museum : 3, North Indian tradition, from Bengal

South Indian sculptures and is entirely discarded in Tamil sculptures except in rare cases like the metal image of the seated Vishṇu with Śrī and Bhūdevī, no. 17 in the Madras Museum (pl. XVII A). Though it occurs sometimes in Chālukyan sculptures and in Hoysala sculptures which are in the Chālukyan tradition, it is not an invariable feature and in any case lacks the prominence accorded to it in the north.

Śaṅkha. The *śaṅkha* (conch) in South Indian and Chālukyan sculptures, whether held in the upper hands or in the lower, is always represented with the spiral top upwards (fig. 30, 1 and 2). But in North Indian sculptures, especially from Bengal and Bihar, it is almost invariably held in the lower left hand, with the spiral top downwards (fig. 30, 3). Deviations from this rule do rarely occur, as in the figures of Vishṇu as Matsya in the Dacca Museum, where, though in the lower hand, it is held with the spiral top upwards, and in the figure of Trivikrama from Jorādeul (Dacca District), also in the same Museum (pl. XIII D), the conch is held in the upper left with the spiral top upwards ; or it is laid flat on a lotus as in the figure of Hṛishīkeśa (pl. XVII C) from Sāgardighī (fig. 30, 3 a).

The conch of Vishṇu in early Tamil and Chālukyan sculptures has a small flame about it (fig. 30, 1 a), especially in Tamil sculptures where even tassels are added in the latest phase. In North Indian sculptures, however, the conch ever remains a natural thing. In Hoysala and late Chālukyan sculptures the flame-ornament and a long tassel-tail are alike present (fig. 30, 1 b and c).

Chakra. The *chakra* (wheel) differs locally in its shape. At Aihole it somewhat resembles a potter's wheel, a cross encircled by a rim. This form occurs also in some other early Chālukyan sculptures, but mainly the *chakra* in early Chālukyan renderings is a solid disc carried in such a manner that the edge almost faces the spectator (fig. 31, 1 b). In this position the *chakra* is carried also in early Pallava sculptures where it is similar in shape to that in the early cave-temple at Bādāmi (fig. 31, 2 a). Even in Madhya Pradesh as in the Trivikrama from Rājim (Raipur District) the *chakra* is not different. In late Pallava sculptures the *chakra*, which already had the small beginnings of flames, develops them and later these flames become a regular feature (fig. 31, 2 b and c). In a slightly modified form and in a different ornamental setting the flames exist even in Hoysala sculptures (fig. 31, 1 c and d). There are flames on either side on top, below and at the centre of the *chakra*. In the late medieval period the *chakra* is represented as flatly facing the spectator ; it is composed of a number of petals and a marginal circle, with flames decorating the sides and centre. Tassels are further appendages in very late sculptures (fig. 31, 1 d). In North India, especially in Bihar and Bengal, it is so decorated that it looks like a sun-flower, with radiating petals all around encircled by a band. From the central hub of most if not all of these *chakras* a tongue of flame issues sinuously and darts upwards (fig. 31, 3 a, b and c). In Hoysala sculptures, the *chakra*, like all other weapons, has a long tassel-tail beneath it (fig. 31, 1 c and d).

Gadā. In all forms of Vishṇu where the *gadā* (club) is in the lower hand it is held in such a manner that the hand is on the handle of the weapon, the thicker end resting on the ground (fig. 32, 1 and 2). But when it is held in the upper hand, as it is mostly in North Indian and occasionally in Chālukyan sculptures, it is so held that the thicker end is uppermost and the handle below (fig. 32, 3 a and b). When it rests horizontally on a flower held in the hand (pl. XVII C), the position is certainly due to the local Tantric Buddhist tradition, and the image is clearly from Bengal, e.g., the bronze representing Vishṇu from Rangpur in the Indian Museum and Hṛishīkeśa from Sāgardighī (Mūrshidābād District); now in the Vaṅgiya Sāhitya Parishad Museum (fig. 32, 3 c).

The *gadā* in early South Indian Pallava sculptures is a heavy long barrel-like thing with a clumsy handle (fig. 32, 2 a), but in early Chola sculptures it is slender with a number

GEOGRAPHICAL AND CHRONOLOGICAL FACTORS

of horizontal bands and is slightly thicker towards the lower end (fig. 32, 2 *b*). In Chālukyan sculptures this lower end is composed of a number of vertical bands with a star-shaped cross-section. This type of club appears in the earliest sculptures at Bādāmi (fig. 32, 1 *b*) and continues in late medieval Chālukyan (fig. 32, 1 *c*) and Hoysala sculptures (fig. 32, 1 *d*). But in later sculptures the tendency is to emphasize these ribs. The *gadā* of Trivikrama from Rājim in Madhya Pradesh is a big rough club with the decoration of an entwined creeper. In sculptures from Bihar and Bengal it is shaped more or less like a flute, solid in section, both ends being decorated with a bulbous ribbed cushion, the top one for the handle and the lower one, which is slightly larger, for the mace-head. This is decorated with a plume-like ornament, decorative like the creeper-design (fig. 32, 3 *b*).

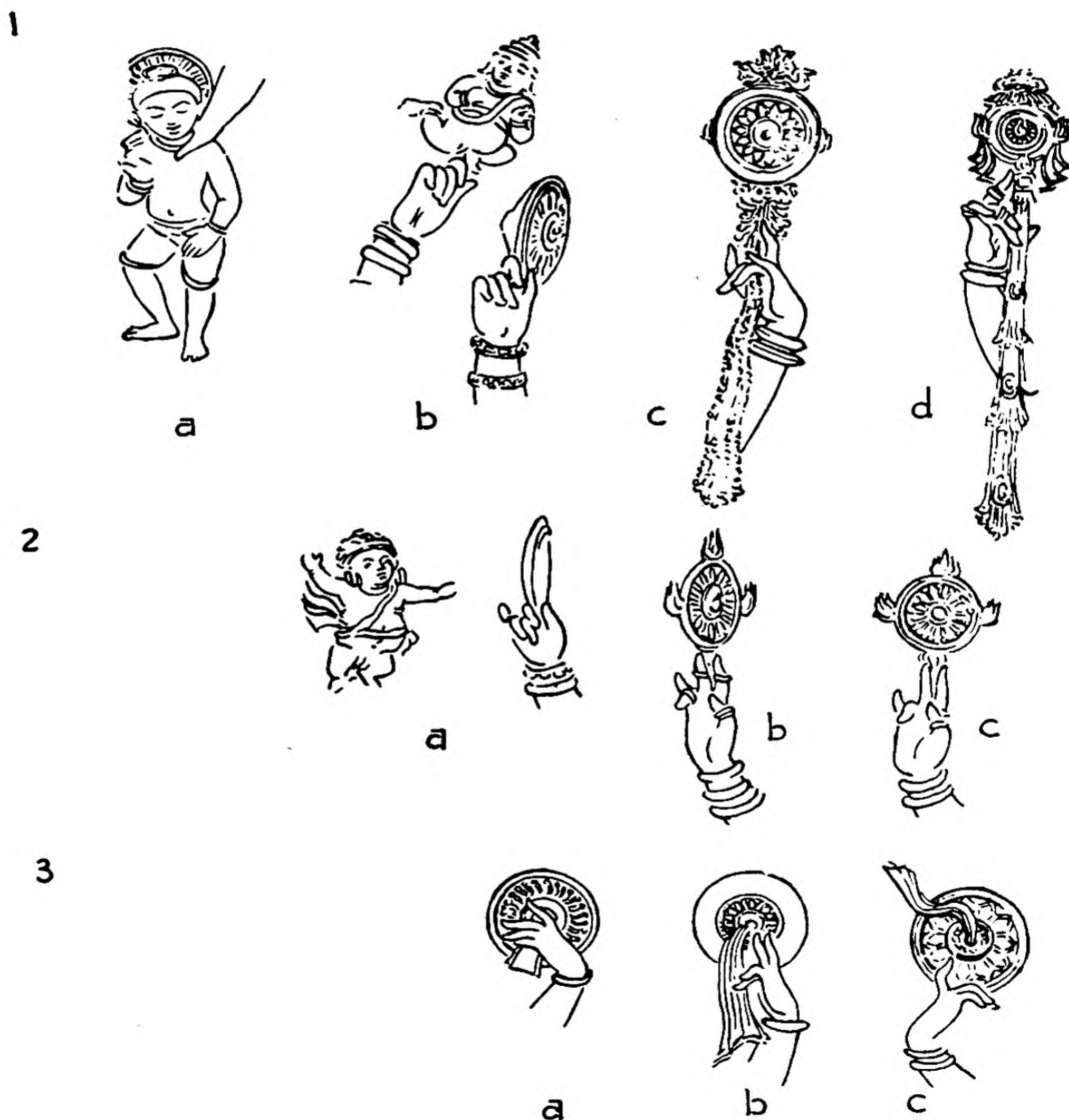
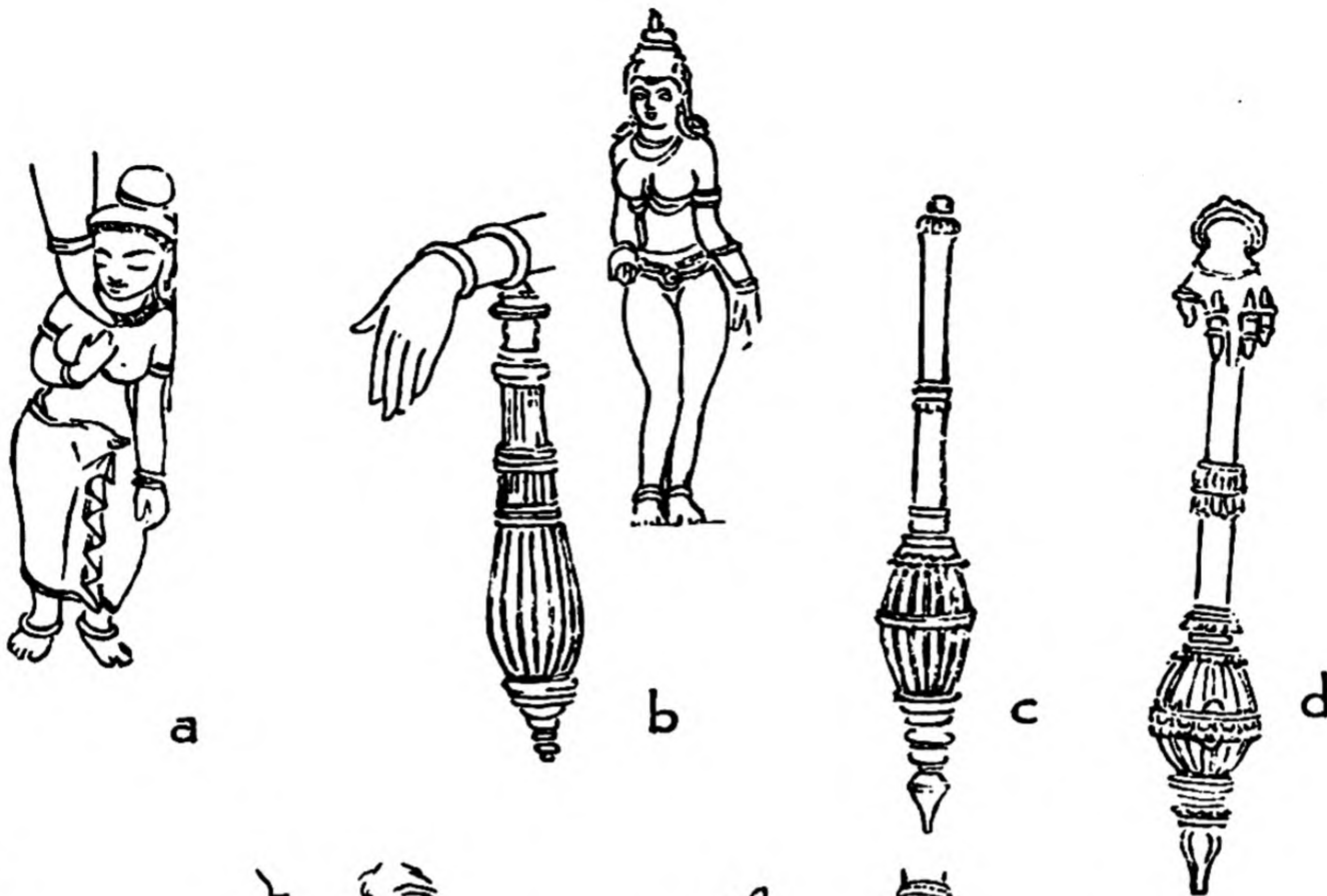
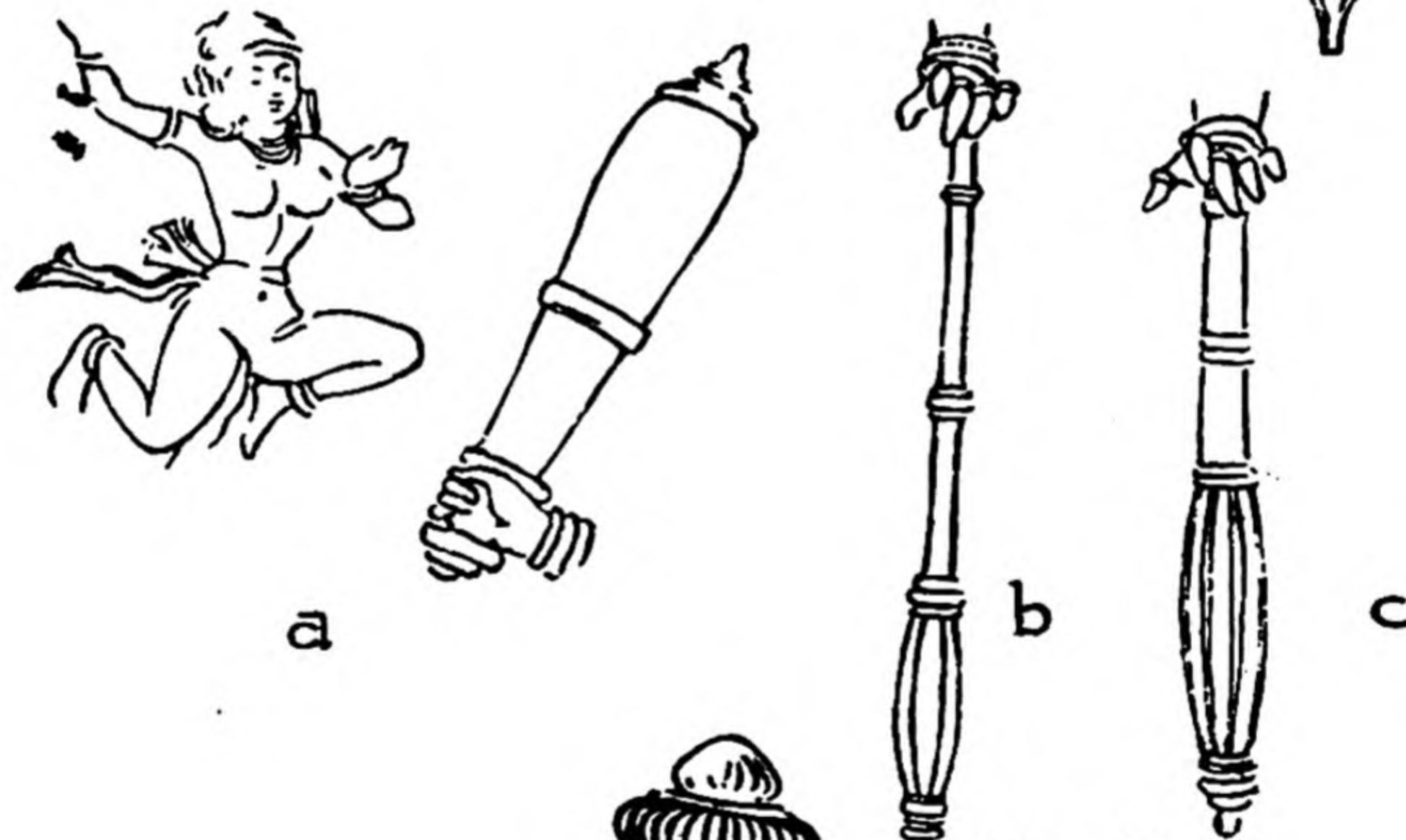


FIG. 31. *Attributes of Vishnu—wheel* : 1, *a*, Gupta, from Rājgir, *b-d*, Chālukyan respectively from Bādāmi, Bāgali and Helebid ; 2, Tamil, *a*, from Mahābalipuram, *b-c*, bronzes in Madras Museum ; 3, North Indian, *a*, from Rajasthan, *b*, from Bihar, *c*, from Bengal

1



2



3

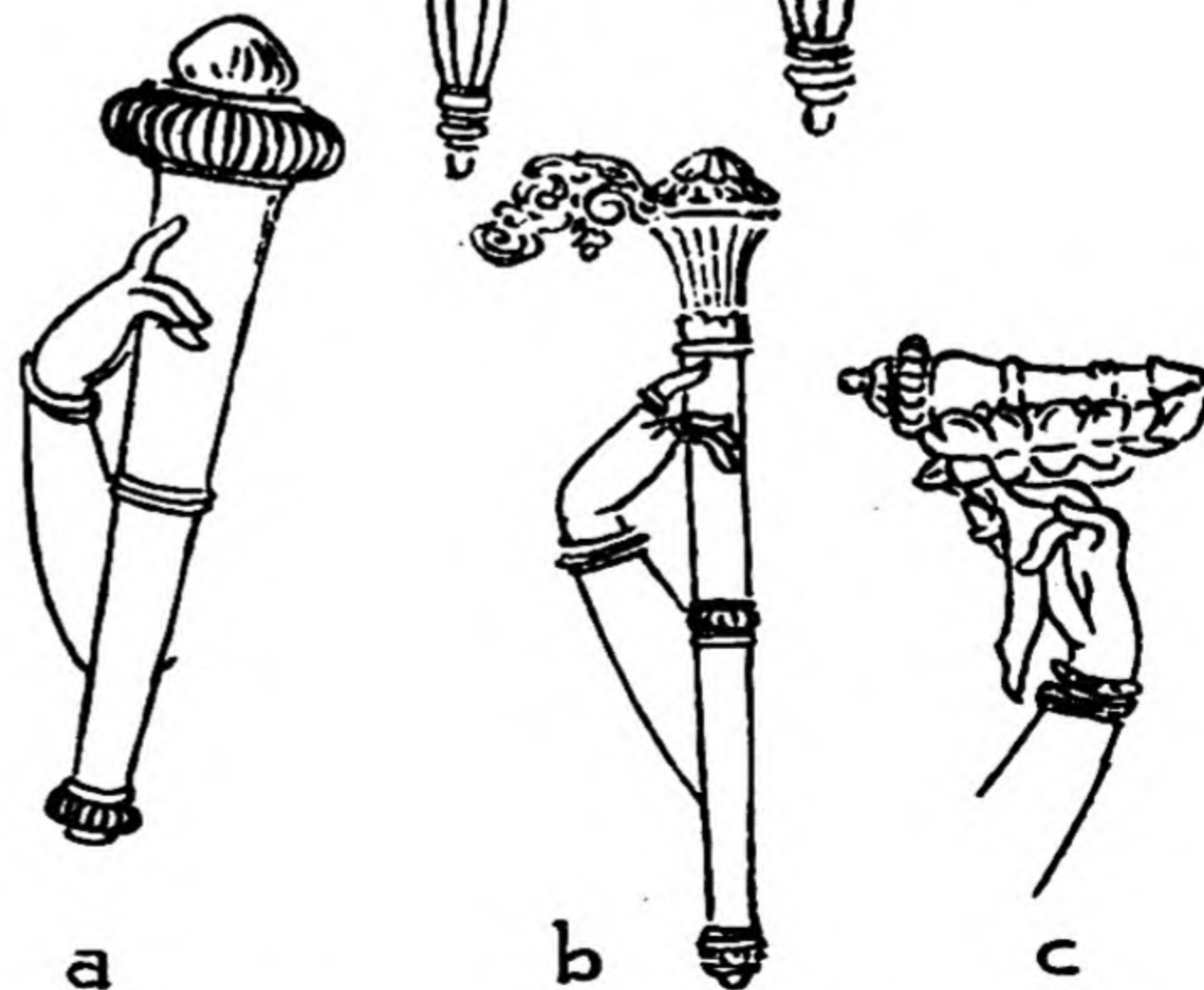


FIG. 32. Attributes of Vishnu—club : 1, a, Gupta, from Rājgir, b-d, Chālukyan, respectively from Bādāmi, Pāgali and Halebīd ; 2, Tamil, a, from Mahābalipuram, b-c, bronzes in Madras Museum ; 3, North Indian, a, from Rajasthan, b-c, from Bengal



A



B



C



D

A, B and C, āyudha-purushas of Vishṇu, respectively from Rājgir, Chaitanpur (Indian Museum) and Bihar (Indian Museum) ; D, śrīvatsa-mark on chest of Vishṇu, from Udayagiri



C



B



A

A and B, Śiva with the third eye, respectively from Kosam, Allahabad (Indian Museum) and Mandasor, Gwalior;
C, Kalyāṇasundara from Chhātingrām, Bagra (Rājshāhī Museum)



A

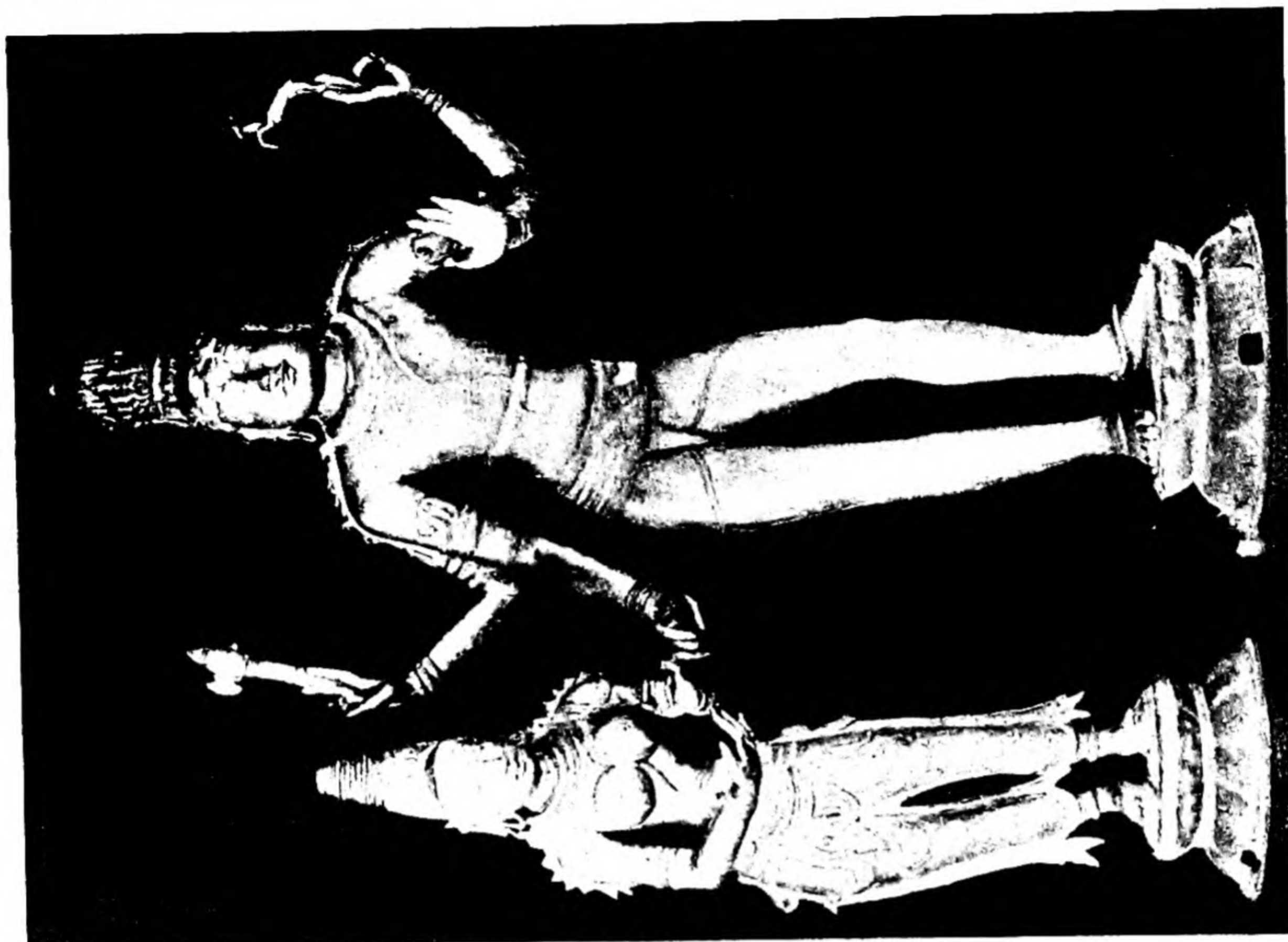


B



C

*Ardhanārīśvara: A, from Mahābalipuram, Chingleput; B, from Tiruvirūmīśaram, Tanjore;
C, from Purāpūrā, Dacca (Rājshāhī Museum)*



B



A

Kalyāṇasundara: A, from Elephanta; B, from Tiruvoltiyūr (Chingoleput)

In Gujarat and Rajasthan (fig. 32, 3a) the Chālukyan type is slightly modified and the long ribbed lower end becomes compressed and bulges into a bulbous ribbed shape. The same type also occurs in Uttar Pradesh, as is to be seen in the image of Vishnu in the Mathurā Museum (pl. XII A).

Padma. The *padma* (lotus) of Vishnu is naturalistic in the earliest Pallava sculptures of South India, but it occurs very rarely, being just shown on the palm held in *abhaya*; usually it is omitted. In early Chālukyan sculptures it is completely absent, but in the late ones it occurs prominently in a highly stylized form, and with long stalk decorated with tassels, like the weapons. In some of the early Chālukyan figures, however, the lotus is represented as a small bud which may be mistaken for a fruit. In sculptures from Bihar and Bengal a full-blown lotus is shown just beneath the hand of Vishnu, and on the palm itself is a smaller flower, while, to balance the larger one, another one is similarly placed on the other side. The lotus signifies water, and its presence near the conch is appropriate.

Āyudha-purushas. In a Gupta image from Rājgir (pl. XVIII A) there is the representation of standing Vishnu wearing the *kirita* and a long *yajñopavita* which serves as the *vana-mālā* as well. He has four hands, two of which are broken, and the other two rest on the shoulders of personified figures of Sudarśana-*chakra* to the right and Kaumodaki-*gadā* to the left. This is an early feature, and even in early medieval sculptures, where earlier Gupta traditions linger, Vishnu is represented as surrounded by *āyudha-purushas*. In the panel of Śeṣhaśāyī-Vishnu from Deogarh (pl. XI A), four *āyudha-purushas* of Vishnu are represented below his serpent-conch, one of whom is attacking the demons Madhu and Kaiṭabha and the others are only watching. The last two are the *chakra* and *gadā*. In other sculptures of early date, such as those from Kākadighi, Lakshmankāṭi in the Dacca Museum and Chaitanpur in the Indian Museum (pl. XVIII B) and some from Bihar (pl. XVIII C) and a bronze figure from Kumārpur (Rājshāhī District) in the Rājshāhī Museum, the *āyudha-purushas* are similarly represented. It is especially to be noted that the *gadā* and *chakra* as *āyudha-purushas* are the favourites, and in all these sculptures except that from Lakshmankāṭi the type is exactly like that from Rājgir (fig. 31, 1 a and 32, 1 a), all these pointing to early tradition and workmanship.

Representations of the *āyudha-purushas* in anthropomorphic form are also found in very early sculptures from the Deccan and South India, but they are rare. In the sculpture of Narasimha from Bādāmi, personified *śaṅkha* and *chakra* (fig. 31, 1 b) are shown fluttering above the hands intended to hold them, *gadā-devī* is shown beside one of them (fig. 32, 1 b), and *padma* is a dwarf near Narasimha's feet. In the representation of Śeṣhaśāyī at Mahābalipuram in the Mahishamardini cave, Sudarśana-*chakra* (fig. 31, 2 a) and Kaumodaki-*gadā* (fig. 32, 2 a) are both shown, the former as a dwarf and the latter as a damsel flying to meet Madhu and Kaiṭabha. Two rare bronzes of early Chola workmanship recently acquired by the Madras Museum represent the wheel and club of Vishnu in anthropomorphic form, the wheel and club being shown actually on the head. It is strange that the *gadā* is here represented as a man and not a woman. Except for this anthropomorphic representations of the *āyudhas* of Vishnu do not occur after the seventh-eighth centuries.

ŚIVA

Weapons and attributes

Śūla. With the exception of a few early Pallava sculptures where Siva is represented as carrying the *śūla* (trident) this weapon is absent from his hand in all South Indian

representations of the deity, and the axe and the deer are invariably held in his upper hands (fig. 33, *a*). On the other hand the *śūla* and snake are usually the distinguishing characteristics of Śiva in northern sculpture and the Chālukyan areas of the Deccan (fig. 33, *b*).

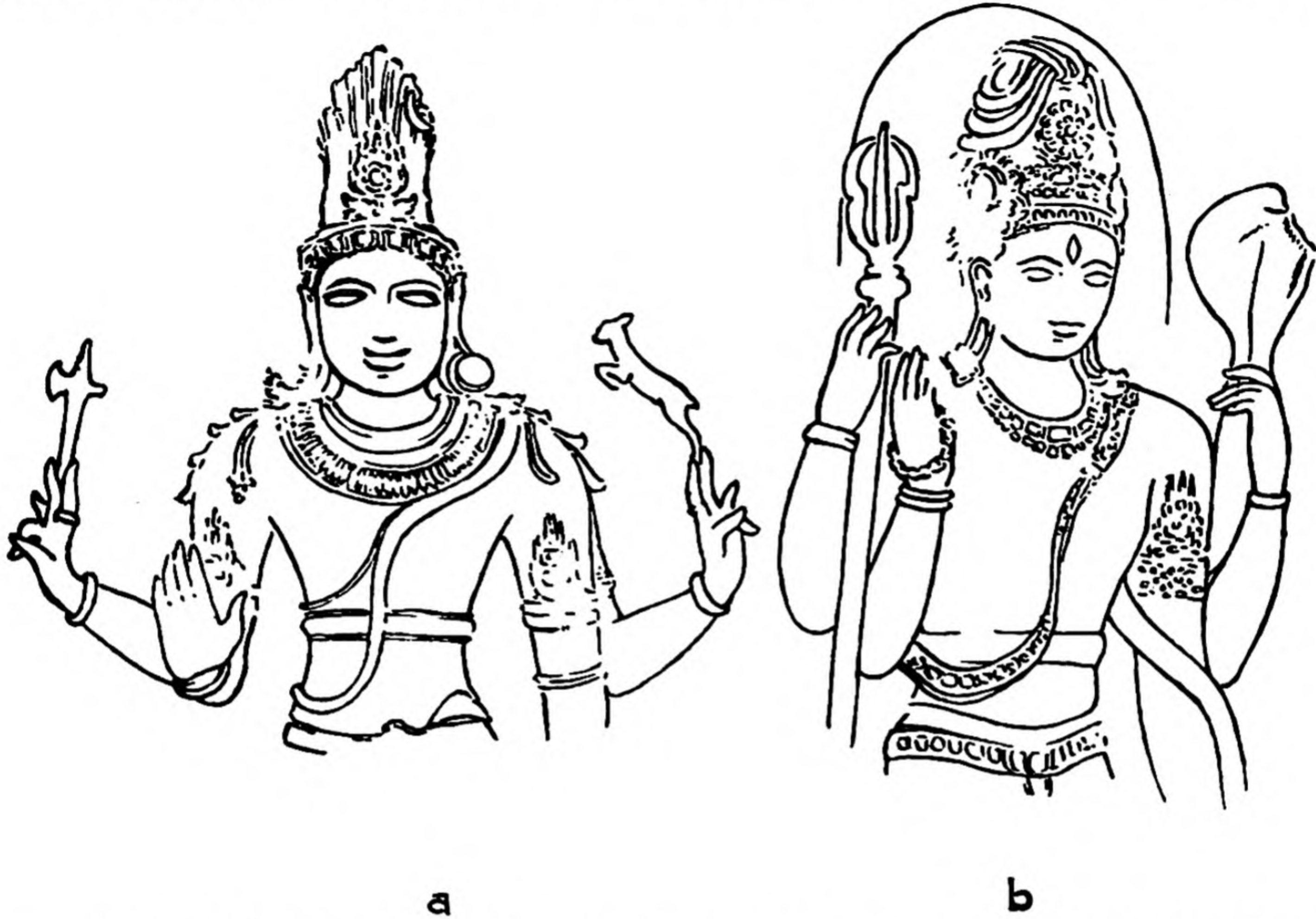


FIG. 33. *Attributes of Śiva : a, South Indian tradition, carrying axe and deer ; b, North Indian tradition, carrying trident and snake*

The *śūla* itself differs in shape according to its locality and age. In the Chālukyan area and North India it has a double curve for the two outer prongs and is more open, and, in the earlier specimens, there is a small *pīṭha* (seat) for the *śūla* whence the long handle starts (fig. 34, 2 *a*). This is elaborated in later Chālukyan and Hoysala work (fig. 34, 2 *b* and *c*). The *śūla* in Pallava sculptures on the other hand is almost circular in contour, its outer prongs being fully curved whilst the long central prong projects upwards the whole resting on a *pīṭha* at the point of the handle (fig. 34, 1 *a*). The shape is somewhat modified in the Chola *śūla*, where the central prong is definitely shorter and of normal height (fig. 34, 1 *b*) ; in later sculptures the contour of the outer prongs becomes less circular and more open and elongated, the *pīṭha* being negligible (fig. 34, 1 *c*). In Bengal the *śūla* held by Devī is peculiar, resembling a three-pronged branch of a tree cut and shaped into a *śūla*.

Paraśu. Similarly, the *paraśu* (axe) of Śiva, which is represented in its true and natural form in Pallava sculptures (fig. 35, 1 *a*), sometimes with even the thong with which the blade is tied to the wooden handle (as in the primitive type)—the true *khaṇḍa-paraśu* of Śiva (fig. 35, 1 *b*)—changes into a cumbersome barrel-shaped object (fig. 35, 1 *c*), like the goad in later sculptures, although in Chālukyan and North Indian carving it is actually the metal axe-head fitted to the handle (fig. 35, 2 *a*). In the ornate Hoysala sculpture the axe, like the other weapons, is profusely decorated (fig. 35, 2 *b*).

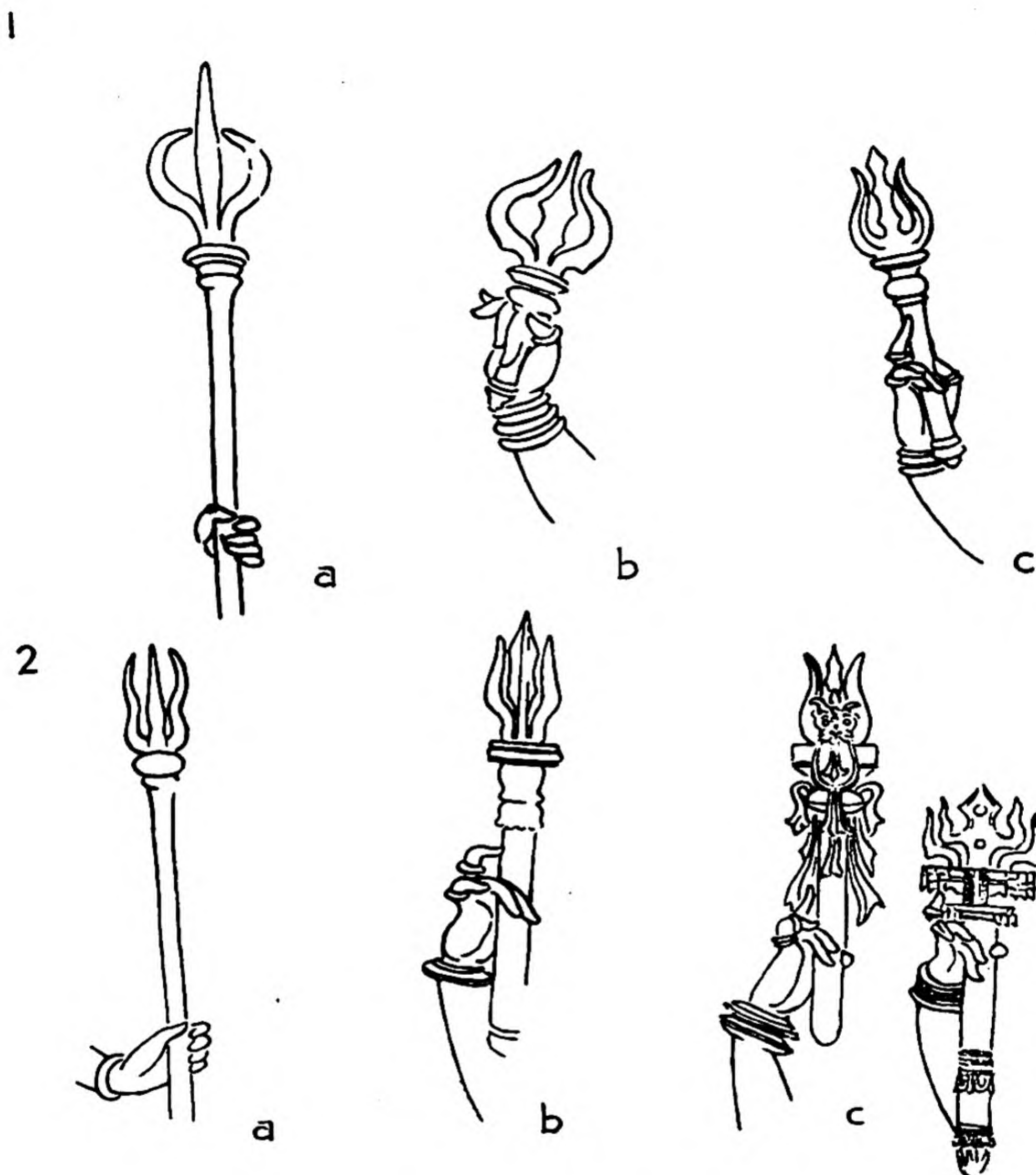


FIG. 34. *Attributes of Śiva—trident* : 1, Tamil, a, from Kānchīpuram, b-c, bronzes in Madras Museum ; 2, Chālukyan, a, from Bādāmi, b, from Bāgali, c, from Halebid

Jaṭā. The *jaṭā* of Śiva differs from area to area as from age to age. Just as its depiction in the Gupta period (fig. 36, 1 a) is different from medieval representation and that of the Pallava period (fig. 36, 2 a) is different from that of the Chōla era (fig. 36, 2 b), similarly, the object as found in northern (fig. 36, 3 a and b) and central India and the Deccan (fig. 36, 1 b and c) is different from that found in southern India (fig. 36, 2 a and b). In the case of Bhairava and Dakshinā-mūrti in the south the flaming hair and *jaṭā* are both shown (figs. 38 and 37).

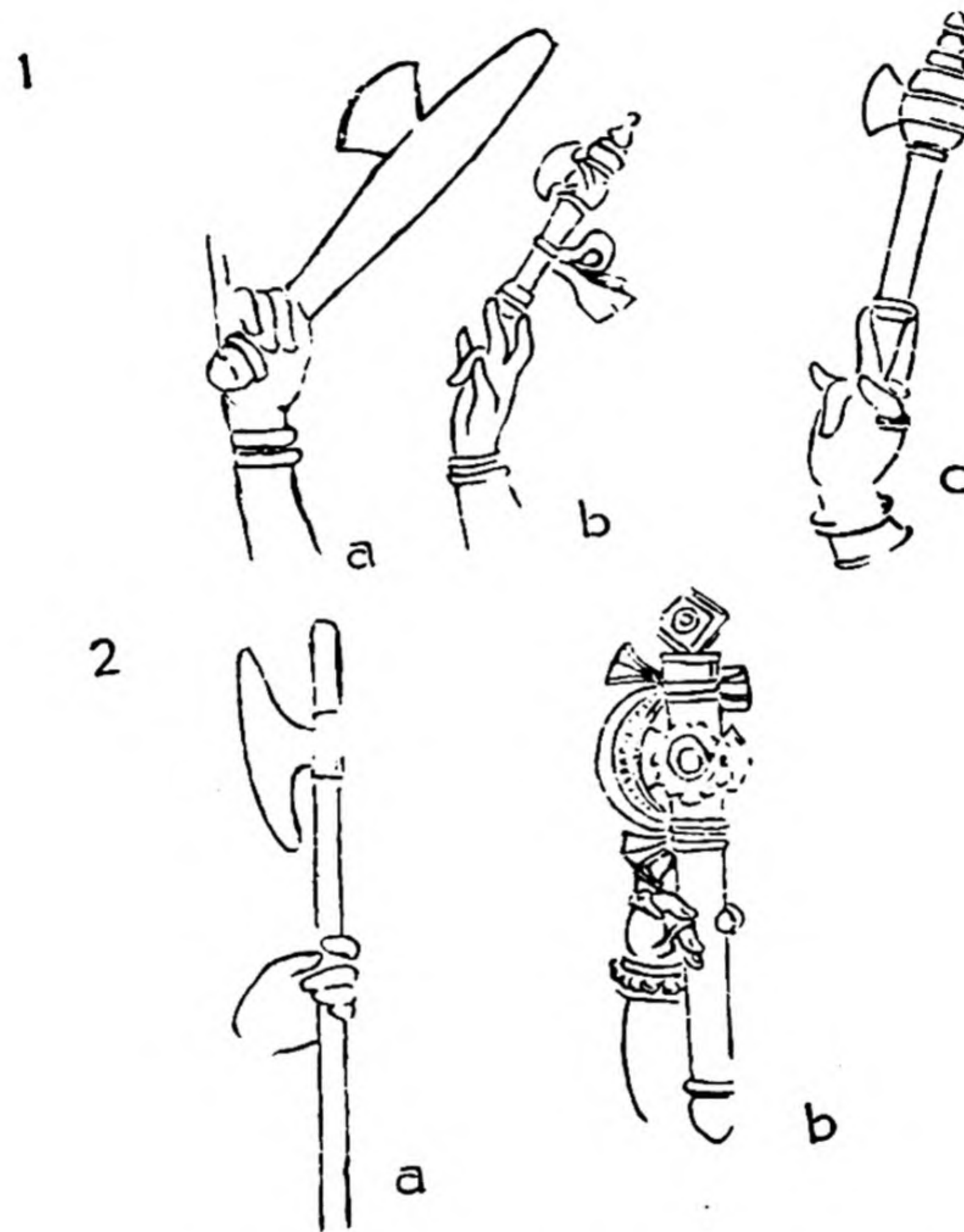


FIG. 35. *Attributes of Siva—axe* : 1, *Tamil*, a, from *Mahābalipuram*, b, from *Māyāvaram*, c, from *Madhurai* ; 2, *Chālukyan tradition*, a, from *Bādāmi*, b, from *Kadur*

The *third eye*, which is another distinguishing feature of Śiva, is usually centrally across the forehead in all periods of sculpture (fig. 39, b), though in Kushān and early Gupta sculptures (pl. XIX A and B) it occurs sometimes centrally along the forehead (fig. 39, a).

1



a



b



c

2



a



b

3



a



b

FIG. 36. *Attributes of Śiva—jaṭā* : 1, a, from Khoh, b-c, Chālukyan, respectively from Bādāmi and Halebid ; 2, Tamil, a, from Tiruchirapalli, b, bronze in Madras Museum ; 3, North India, a, from Uttar Pradesh, b, in Rājshāhī Museum



FIG. 37. *Attributes of Śiva : jaṭābhāra (mass of locks), sculpture from Cholaṁāḷigai (Madras Museum)*



FIG. 38. *Attributes of Śiva : jaṭā as flaming hairs, sculpture in Madras Museum*

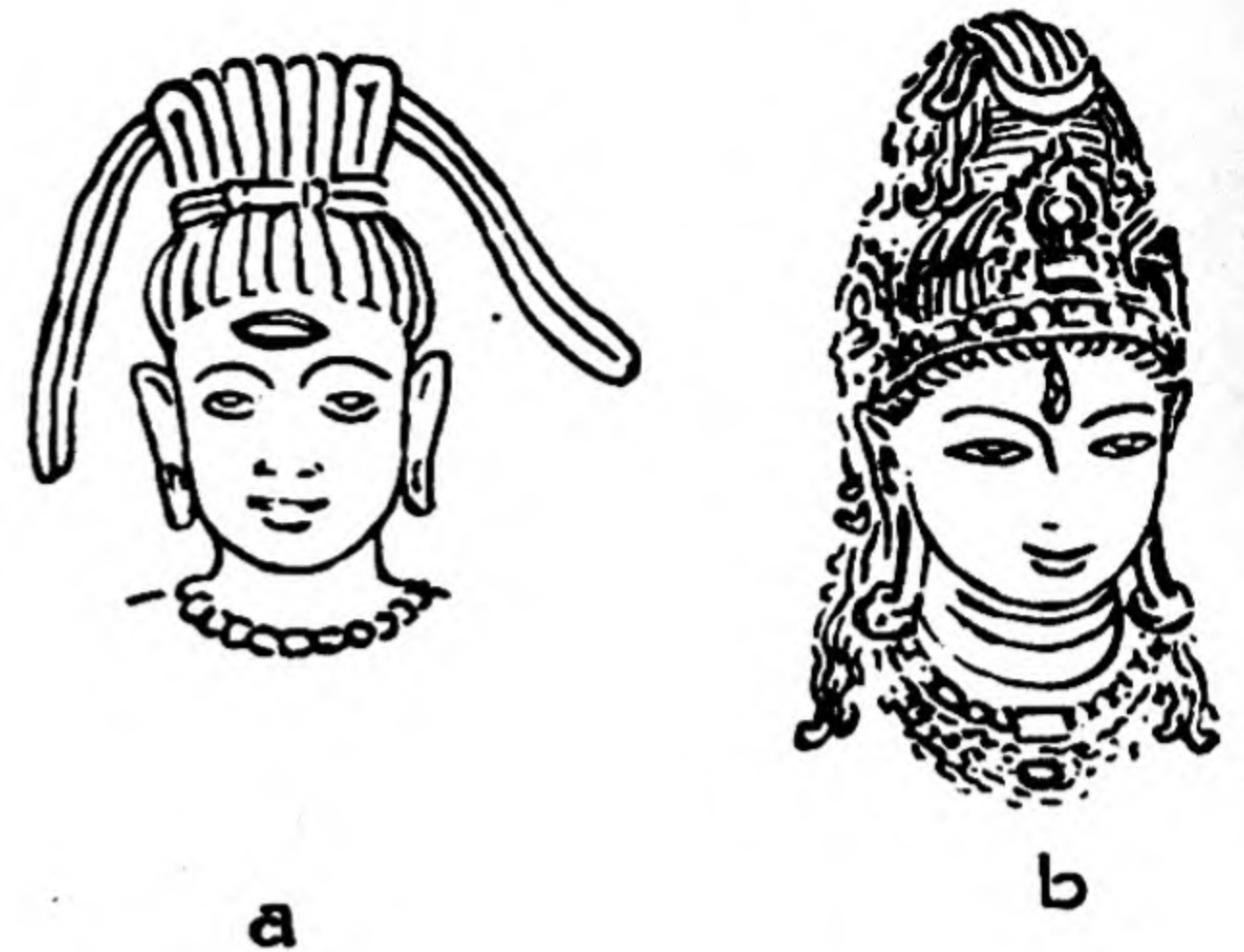


FIG. 39. *Attributes of Śiva—the third eye : a, sculpture in Indian Museum ; b, from Bhumarā*

Ardhanārīśvara

Śiva as Ardhanārīśvara in the Tamil area shows an evolution during the centuries. The early type, of which there is a remarkable example in the Dharmarāja-ratha at Mahābalipuram (Chingleput District), is a masterpiece of art showing one-half male and the other female (pl. XX A). In spite of the inevitable monstrosity of the form, one must admire the characteristic droop in the shoulder, the dip near the waist and the ample pelvis of the female-half, and the broad shoulder and chest of the male-half, both showing an excellent knowledge of human anatomy and effectiveness in spite of the difficulty of the *samabhaṅga* pose. In somewhat later sculptures, as at the Nageśvarasvāmī temple at Kumbakonam and Tiruvirāmiśvaram (both in Tanjore District), representing the earliest Chola art in its transitional stage from Pallava, flexions are resorted to and the demeanour of the figures change (pl. XX B). These early sculptures show two arms of Śiva on one side and only one arm of Pārvatī in the other half. But in later sculptures, as in the late Chola and Vijayanagara periods, the figure is a stylized one, divided into two with an equal number of arms on both sides and the two halves having exactly the same anatomy except for the female breast on the left. In late Pallava sculptures Ardhanārīśvara is shown seated on Nandin, whilst in the Kailāsanātha temple at Kāñchipuram

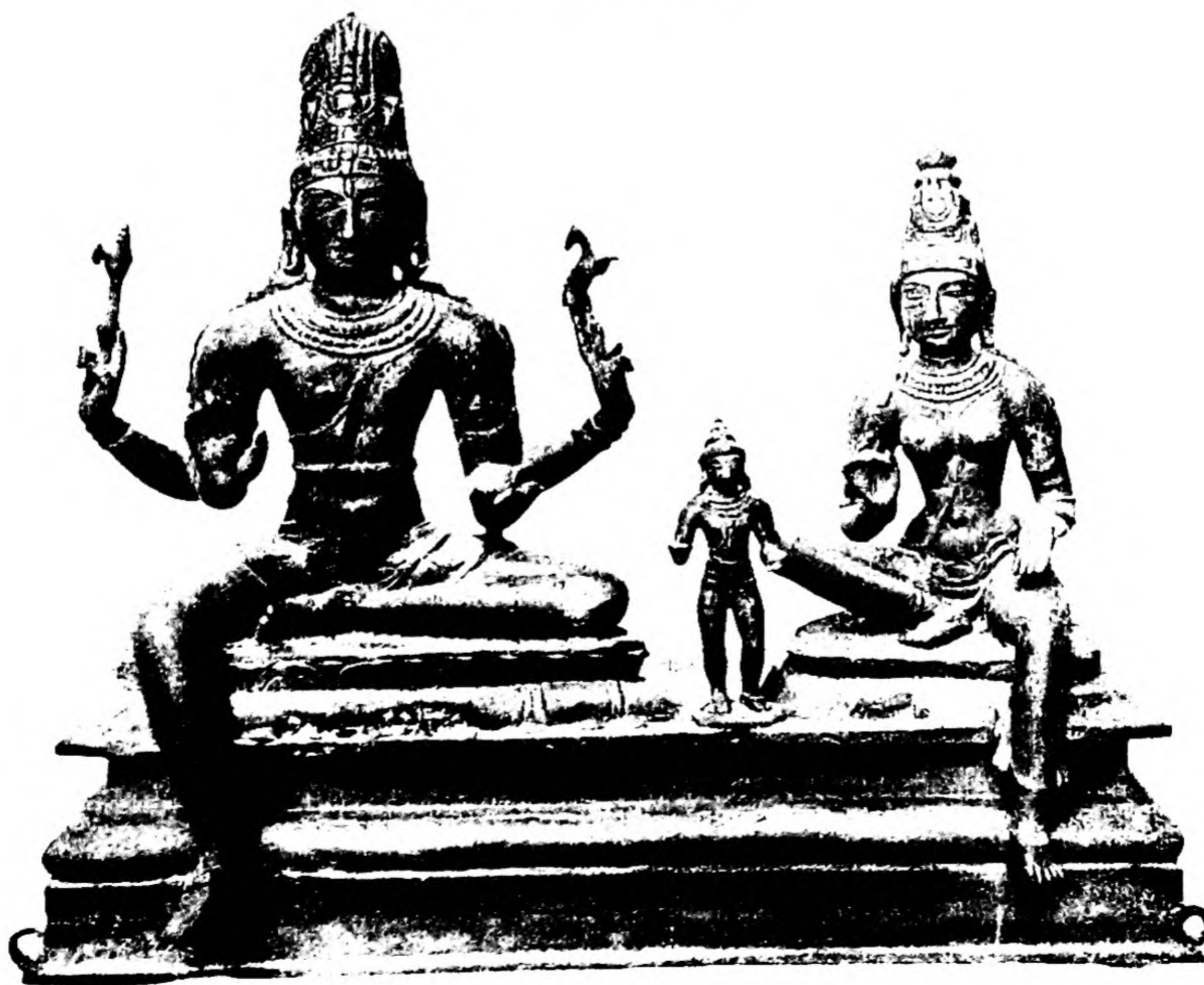


A



B

A, *Nara-nārāyaṇa*, from *Deogurh, Jhānsi* ; B, *Dakṣiṇā-mūrti*, from *Cholamāligai, Tanjore*
(*Madras Museum*)



C



A



B



C



D

To face plate XXIII

PLATE XXIV



A



B



C



D



A



B





A



B



C

A, Nataraj, from Uttar Pradesh; B and C, Vinādhara, respectively from Sagganur, Tanjore
(Madras Museum) and Lakṣmīnārāyaṇa, Dehra Dun

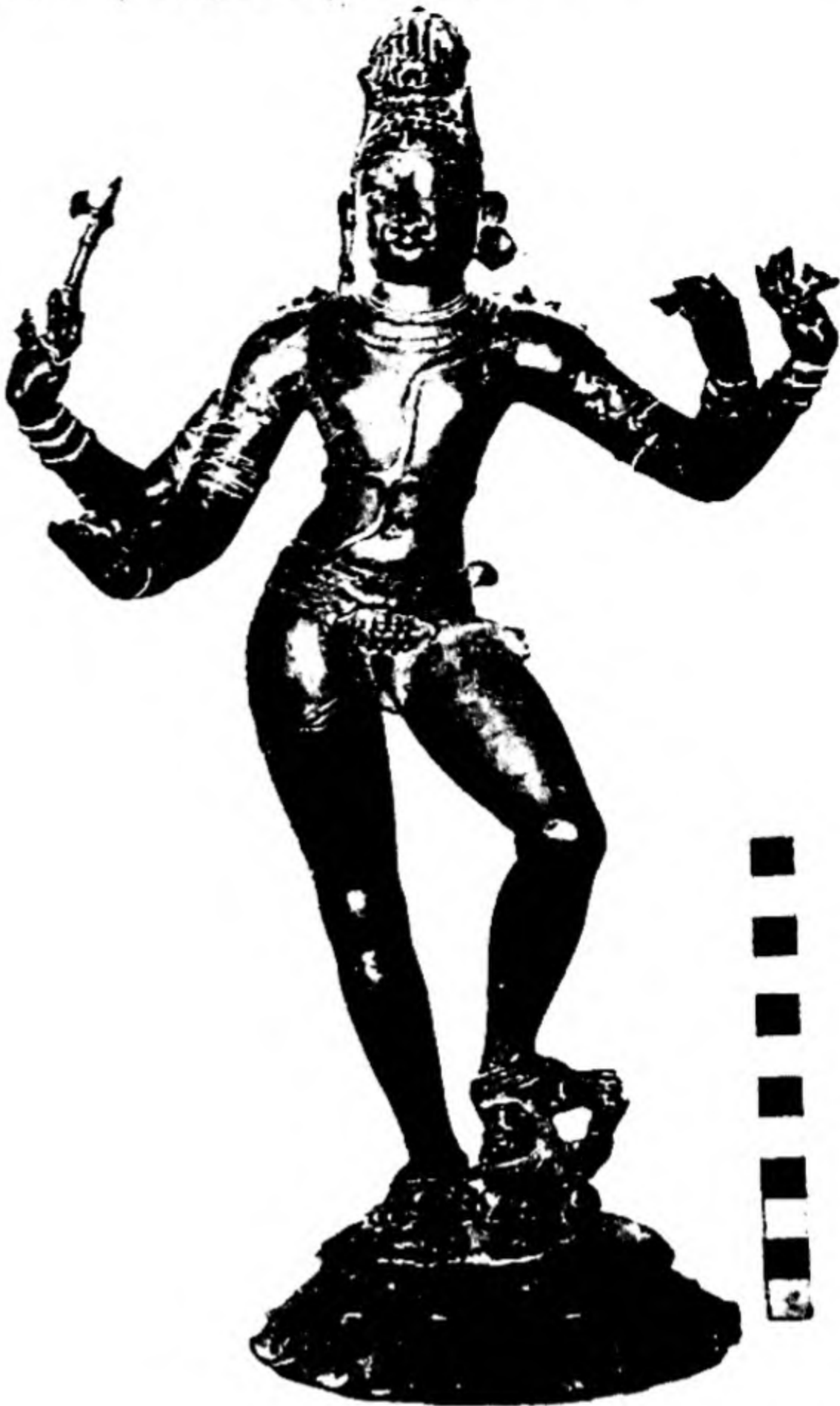


1





A



B



C



D

and in other early Chola sculptures Nandin is shown beside the deity, one of whose hands rests on it. In the stylized late figures Nandin is absent.

The form of Śiva itself is distinguished in South and North India by certain differential features. The Ardhanārīśvara concept of Śiva is emphasized in South Indian sculptures and, though it is only in the actual Ardhanārīśvara representation that full and explicit expression is given, a suggestion of the form in representations of Śiva is achieved by a slight change in the depiction of the *kunḍala* on either ear. The *patra-kunḍala* worn by a woman is shown on Śiva's left ear and the right ear is either bare or has a *makara-kunḍala* (fig. 37). This kind of treatment of Śiva's *kunḍalas* is rare in northern sculpture, though there are instances. Never is he shown in South India with his *liṅga* perceptible, as in some North Indian sculpture, except perhaps in Guḍimallam where the *liṅga* is clear in spite of the drapery. In some North Indian sculptures not only has Śiva this feature but the *liṅga* is erect. This is to emphasize the concept of *ūrdhvaliṅga* and his yogic control of senses as voiced in Kālidāsa in the first verse of his *Mālavikāgnimitra* : *kāntā-sammīśra-deho=py=avishaya-manasām yaḥ parastād=yatīnām*.

This feature is best illustrated in North Indian representations of Ardhanārīśvara, where, though one-half is Pārvatī and the other half Śiva, still the *ūrdhvaliṅga* depiction persists. It may be noted here that in the Ardhanārīśvara from Bengal the *ūrdhvaliṅga* of Śiva is present on the right side as in any other complete image of the deity (pl. XX C). This peculiarity extends to the area of Orissa, south of which it is absent. Even in Chālukyan sculptures strongly influenced by the northern Gupta traditions, this feature likewise is absent, which is in accordance with the southern tradition generally. This is not surprising ; we shall see presently the area around the capital of the Western Chālukyas was the meeting-place of South Indian and North Indian traditions. For is it not here—at Bādāmi, Aihole and Paṭṭadakal—that the northern and southern forms of the *vimāna-kalaśas*, crowns of temples, occur side by side ? Here the Gupta style of Gaṅgā and Yamunā guarding the gateway occurs, and here the southern tradition of the seated dwarfish *śaṅkha* and *padmanidhis* is found, which, judging from the description of Kālidāsa in his *Meghadūta* (II, 19), *dvar-opānte likhita-vapushau śaṅkha-padmau cha dṛiṣṭvā*, should have been in vogue in North India as well.

Kalyāṇasundara

The form of Kalyāṇasundara, or Śiva marrying Pārvatī (*pāṇi-grahana*), is a common type all over India. Kālidāsa's picture of Himavat giving Pārvatī in marriage to Śiva (*Kumārasambhava*, VII, 76) is the scene in the early medieval western Indian sculpture, as at Elephanta (pl. XXI A). In South India the early Chola bronzes present only the two principal figures of the wedlock in bronzes (pl. XXI B) ; stone sculptures showing the complete scene are rare. In sculptures of the Vijayanagara and Nāyaka periods, Pārvatī is depicted as standing between Viṣṇu and Śiva, the former giving her in marriage to the latter ; and here the pouring of water by Viṣṇu on Śiva's hand and the presenting of Pārvatī as a gift or *dāna* to Śiva emphasizes the *kanyakā-dāna* aspect of marriage. In Bengal, the usual representation of the marriage of Śiva shows Pārvatī in front of Śiva (pl. XIX C) probably indicating the *sapta-paḍī* or seven friendly steps that make the wife the companion of her husband in life.¹ This is a good example of local emphasis on a custom in sculpture.

¹ Bhattasali, *op. cit.*, p. 121.

Vīṇādhara

Siva as Vīṇādhara, known as Vīṇādhara-dakṣiṇā-mūrti, is popular in South Indian sculpture and is always shown as a standing figure carrying the *vīṇā* (lute) in two of his hands, the other two holding the axe and the deer. In sculptures from the Chālukyan area, Vīṇādhara Siva is shown seated, and his concept is mixed up with that of Vīrabhadra, who, like Gaṇeśa, flanks the Saptamātrikā group. In these representations he most often carries the drum and the trident in his other pair of arms. In Bengal there is no separate representation of Vīṇādhara form, though the concept is very prominent in some of the forms of Natesa, with which this idea is commingled. In some representations of Natesa from Bengal the deity is shown dancing on the bull, with the *vīṇā* in one of his many pairs of arms. This is the Vīṇādhara-cum-Natesa of Bengal.

Dakṣiṇā-mūrti

Early representations of Dakṣiṇā-mūrti Siva as the teacher of the highest truth closely resemble the Nārāyaṇa form of Viṣṇu, as may be seen in Gupta sculpture where two deer and a snake are shown at his feet, his right hand being in the *vyākhyāna-mudrā* or teaching attitude (pl. XXII A). These characteristics are found in Pallava sculptures of Dakṣiṇā-mūrti (pl. XXVIII A), but the deer and snake, especially the former, which suggest the scene of the first sermon of Buddha, disappear in Chōla sculpture (pl. XXII B), where only old sages listen to the young teacher, crushing ignorance in the form of a dwarf beneath his feet. From the medieval period Dakṣiṇā-mūrti becomes scarce in North India and like some forms as Bhikṣāṭana-mūrti, Kaṅkāla-mūrti and Somāskanda become a form more or less confined to South India.

Somāskanda

Though Kālidāsa has suggested the form of Somāskanda in his description of the happy Siva and Umā in the company of Skanda (*Raghuvamśa*, III, 23), no such figure has been discovered in North India. On the other hand it is the Umā-maheśvara type which is popular there. Somāskanda, i.e. Siva with Umā and baby Skanda, an invariable feature in Pallava temples where they occur behind the *liṅga* on the wall of the cell (pl. XXIII A), becomes a regular feature as a bronze *utsava-vidyā* in the early Chōla period (pl. XXII C) and continues as one of the most popular forms for Siva-worship in temples of the Tamil area. Umā-maheśvara is, however, more popular in the Kanarese districts (pl. XXIII B), where the northern tradition (pl. XXIII C) is often noticed.

Tripurāntaka

In all early representations of Tripurāntaka up to the early Chōla period, Siva is shown standing or seated in a pose resembling *ālīḍha*, on a chariot with a drawn bow in his hand and in the act of attacking the enemy. In the famous panel of Tripurāntaka from the Ellora temple the representation is that of Siva standing on a chariot with a drawn bow attacking the Tripuras. In Pallava sculptures, e.g. from Kailāsanātha temple at Kāñchīpuram, the representation is similar (pl. XXIII D). In the perambulatory passage of the central shrine of the Bṛihadīśvara temple at Tanjore there are fine early Chōla paintings of about the time of the temple itself (c. 1000), and the most magnificent of these is a representation of Siva seated on his chariot and fighting the Tripuras with

his drawn bow. But in many other contemporary and in all later representations Tripurāntaka is generally shown as standing with a bow in his hands, his left leg occasionally resting on a dwarf, obviously Apasmāra, who is usually shown trampled by Nāṭeśa and Dakṣiṇā-mūrti (pl. XXVIII B). In some late sculptures of the Vijayanagara and Nāyaka periods, Śiva is represented standing sideways on his chariot and attacking the demons with his bow. An instance is the painting of the deity from Lepākshī (Anantapur District).

Bhairava

The commonest representation of Bhairava is that of Baṭuka-Bhairava, stark naked, with an elongated *yajñopavīta* of bells or skulls, flaming hair, and a *kaṭisūtra* composed of snake (fig. 38). His face is represented in anger, and sharp protruding teeth may be noticed at either end of the mouth. In South Indian representations he is always shown beside a dog, his vehicle, and he carries *damaru* (small drum), *pāśa* (noose), trident and skull-cup in his four hands (pl. XXIV A). He has knit eye-brows. His *yajñopavīta* in the Tamil country is composed of a garland of bells, and the *kaṭisūtra* is invariably a snake. His feet are bare and rest on the pedestal. In North Indian and in Chālukyan sculpture the difference to be noticed is that he carries a sword in the place of the *pāśa*, the other weapons being the same. His flaming hair radiates all around sinuously, and the tips of his locks curl into terminal circlets. His *kaṭisūtra* is not composed of the snake, and his *yajñopavīta* is a garland of skulls. He stands not on the pedestal directly but on wooden *pādukās* (sandals), an invariable feature in North Indian and Chālukyan sculptures (pl. XXIV B). These figures are late medieval.

Gaja-saṁhāra-mūrti

The representation of Gaja-saṁhāra-mūrti as a pure concept is confined to the Tamil and Chālukyan areas. The finest representation of Gaja-saṁhāra-mūrti from South India is the early Chōla bronze from Vaḷuvūr (Tanjore District). The deity rests his right leg on the elephant's head, while the other is lifted up and bent; the body is twisted and two of his eight arms opened out to stretch the hide of the animal in a characteristic manner (pl. XXVIII D). Other good examples come from Dārāsūram (Tanjore District), Perūr and elsewhere. The representation of Gaja-saṁhāra-mūrti in the Chālukyan area, though very similar to that in the Tamil Districts, has its own characteristics. The sculpture from Hemāvati (Anantapur District), representing Nolamba work, shows the earlier Chālukyan tradition, while the one from Halebid (Hasan District) depicts the later one. In the latter not only has Śiva sixteen arms, unlike the eight-armed figures, but he is shown only as dancing in the *chatura* pose with his left leg slightly raised. But even here the concept is purely that of Śiva as slayer of Gajāśura.

The traditional representation of Gaja-saṁhāra-mūrti in North India is different. In the caves of Elephanta and Ellora the form of Andhakāśura is graphically portrayed in a very spirited attitude, holding up the demon Andhaka after goring him with his *trisūla*. In the representation at Elephanta, which, though mutilated, is a masterpiece of workmanship, Śiva is represented appropriately as in a rage. The presence of Yogesvarī, the emaciated goddess produced from the flame of Śiva's third eye, and Devī, as witness of this great encounter of her spouse with this formidable demon, is clear in the well-preserved representation at Ellora. In this, above Śiva and held up by two of his outstretched arms from among eight, is the elephant's skin, which includes the drooping elephant's head and legs; the elephant's head is not present under the deity's feet as we find in South Indian representations. The reason for this is that this figure of Śiva represents

at once Śiva as Andhakāśura-saṁhāra-mūrti and as Gaja-saṁhāra-mūrti.¹ The form occurs in exactly the same fashion in early medieval representations of Andhakāśura-saṁhāra-mūrti from Orissa, good examples of which exist in the Indian Museum, Calcutta (pl. XXIV C). Here also Yogeśvarī and Devī are present. The form of Bhairava from Bengal similarly combines these three aspects (pl. XXIV D). This combination of Gajāntaka and Andhakāntaka represents the North Indian tradition and in a way is appropriate, as according to the story of the *Varāha-purāṇa* Gajāśura was first overcome by Śiva, who used the hide of the animal as an upper garment before he attacked Andhakāśura. The two concepts have therefore been united into one.

Atiriktāṅga-Bhairava

Representations of Atiriktāṅga-Bhairava, a skeleton-form, are frequently found in the Ellora caves ; this is not surprising, as other skeleton-figures, e.g. Chāmuṇḍā, are known to Chālukyan tradition (above, p. 30). Yogeśvarī at the feet of Andhaka-saṁhāra-mūrti is yet another example unknown in the Tamil region, where the only known skeleton-form is Bhṛīṅgin.

Nāṭeśa

One of the most famous forms of Śiva all over India, and especially in South India, is his dancing form known as Nāṭeśa. The most popular form in South India is the *ānanda-tāṇḍava* with the left leg raised, the right leg resting on Apasmāra ; the right lower hand in *abhaya*, the right upper holding the *damaru*, the left upper the flame, and the left lower in *kari-hasta*. His locks are half-tied up, parts of his *jaṭā* fly about on either side during his ecstatic movements, a skull appears from his locks, a *dhatūra*-flower is stuck near it, snakes entwine the locks and *ketakī*-petals peep from them. The celestial river Gaṅgā, settled on one of his *jaṭās*, joins her palms in devotional admiration, while *pārijāta* and other celestial flowers are shown slipping from the *jaṭā* like stars on the firmament, red in the evening glow. A bronze representing a four-handed Śiva dancing in this position is found in almost every temple of importance in the peninsula (pl. XXV A). Natesa in the *chatura* and *lalita* poses is extremely rare in South Indian Tamil representation. The *chatura* image of Nāṭeśa from Nallūr (Tanjore District) and from Tiruvarangulam (Pudukkoṭṭai) are stray examples, and in the former the four additional arms form another unusual feature. But both of them are shown dancing on the Apasmāra dwarf, a constant feature in South Indian sculptures.

The *chatura* and *lalita* mode of dance, however, is a greater favourite in West and North India and in the Chālukyan area. In one of the early caves at Mogalrājapuram near Vijayawāḍa on the top of the façade is a representation of Nāṭeśa. Unfortunately the figure is mutilated, but it can easily be seen that it was a fine figure representing multi-armed Śiva in the *ānanda-tāṇḍava* pose, his left leg resting on the Apasmāra dwarf in the South Indian fashion. There is here a blend of North Indian and South Indian traditions, for the figure is multi-armed following the North Indian tradition (cf. Kālidāsa's *bhujā-taru-vana*, 'forest of arms', *Meghadūta*, I, 36) the South Indian element being represented by the dance-pose and the dwarf.

¹ C. Sivaramamurti, 'Iconographic Gleanings from Epigraphy', *Proceedings of the Thirteenth Oriental Conference* (Nagpur, 1951), Archaeology Section, p. 39.

In very early Western Chālukyan sculptures Śiva is represented as dancing beside the bull in the *chatura* or *lalita* pose, sometimes on the floor. In Tamil sculptures the lotus-platform occurs as a circular or oval support beneath the dwarf. As already pointed out above (p. 57), Bādāmi and Paṭṭadakal represent the region in the Chālukyan area where the northern and southern elements meet. The lotus-pedestal beneath the feet may sometimes be absent. Sometimes Nāṭeśa from this area is represented as dancing over a dwarf and with only four hands, one of which carries a *śūla* or a *vṛishabha-dhvaja* (bull-standard) as in the panel from the Virūpāksha temple at Paṭṭadakal (pl. XXVIII C). This feature may also be observed in the rock-cut temple of Kailāsa at Ellora, where Śiva similarly dances on a dwarf—a Tamil feature—the North Indian characteristics being the absence of the dwarf and the presence of the bull. In the Orissan area, e.g. at Mukhalin-gam (Viśākhapatnam District), Śiva is represented as multi-armed and dancing in the *chatura* pose, with the bull beside him (pl. XXV B). Similarly in the rock-cut panels near Budhi-Chanderi in Gwalior, Śiva is dancing in the *lalita* pose with the bull beside him (pl. XXV C).

In the eastern school of medieval sculpture there is a characteristic representation of Nāṭarāja known as Narteśvara (pl. XXV D). Here Śiva is multi-armed and dances in the *chatura* pose, not beside but on the back of the bull, which also is often represented as in an ecstatic state. The bull thus takes the place of the Apasmāra dwarf of South Indian representations.¹

There is another peculiarity in the iconography of Nāṭeśa from Bengal. He is here represented not only as dancing on the bull as the lord of dance but sometimes as carrying the *vīṇā* as the presiding deity over music. In other North Indian sculptures (pl. XXVI A) he is shown sometimes with the *vīṇā* but dancing not on the bull but beside it. This aspect of Śiva is separately represented in one of the Dakṣiṇā-mūrti types in South India known as Vīṇādhara-dakṣiṇā-mūrti (pl. XXVI B). The god is shown as standing with two of his four arms in the attitude of playing the *vīṇā*. In the Kanarese area and the Deccan, Śiva as Vīrabhadra, flanking the Saptamātrikās along with Gaṇeśa, is represented as seated and carrying the *vīṇā*, just like Vīṇādhara-dakṣiṇā-mūrti in the Tamil area. In North Indian sculpture Śiva is sometimes represented as seated or standing along with Pārvatī and carrying the *vīṇā*, again like the Vīṇādhara-dakṣiṇā-mūrti of South India. A seated representation is at Ellora, and an example in standing pose is at the Lakṣhāmaṇḍal temple (Dehra Dun District), where Nandin is shown beside him (pl. XXVI C), thus combining a concept of the South Indian icon Vṛishabhavāhana-mūrti. These different forms of Śiva, seated, standing and dancing, all the time carrying a *vīṇā* and sometimes fused into another equally important concept, shows the popularity of the Vīṇādhara aspect of the god.

The form of Nāṭeśa thus betrays distinctive differentiation in different geographical areas, dancing four-armed on the Apasmāra dwarf in South India, dancing multi-armed in the *chatura* or *lalita* pose on the ground on lotus-pedestal, sometimes with the bull beside him, in the central area, and dancing, multi-armed, in the *chatura* or *lalita* pose on the bull in the eastern school.

Gaṅgādhara

The concept of Gaṅgādhara and its chronological development is an interesting study. The somewhat rare anthropomorphic representations of Gaṅgā descending on

¹ Bhattasali, *op. cit.*, p. 112; R. P. Chanda in *An. Rep. Arch. Surv. Ind.*, 1924-25 (1927), p. 126.

the locks of Śiva in three streams, like the ones from Aihole and Elephanta (pl. XXVII B) emphasize the *tripathagā*-aspect of the stream. A representation of a special nature emphasizing another aspect of Gaṅgā as Jāhnavī, the stream that issued from the ear of Jahnu the sage, is found on the Kailāsa temple at Ellora. In such a case the form of Gaṅgādhara is sometimes characterized by a special name Gaṅgā-visarjana-mūrti.

The early representation of Gaṅgādhara from the Tiruchirapalli cave (pl. XXVII A) of the time of Mahendravarman (about the beginning of the seventh century) shows Gaṅgādhara unaccompanied by Pārvatī and just receiving Gaṅgā on two of his locks held out with his fingers for the purpose ; Gaṅgā is shown in anthropomorphic form coming and settling down with her hands joined in adoration. In sculptures of over a century later Gaṅgādhara is similarly shown as receiving Gaṅgā but with Pārvatī beside him, evidently not very happy in having a co-wife but at the same time not pronouncedly displeased. Such representations are from the late Pallava temples like the Kailāsanātha and Mukteśvara temples at Kānchīpuram or the Gaṅgādhara-mūrti panel from Ellora or from Elephanta. The earlier type, without Pārvatī, continues sometimes even in the ninth century Chōla sculpture (pl. XXVII C). In the Chōla sculpture of the eleventh century at Gangaikondacholapuram (Tiruchirapalli District) Śiva is shown as embracing Pārvatī, thus trying to make her forget her grievance of acquiring a new co-wife. The hands of Siva touch the bosom of Pārvatī in his conciliatory love-making to her. But in



FIG. 40. Śiva as Gaṅgādhara, painting from Lepākshī temple, Anantapur District

GEOGRAPHICAL AND CHRONOLOGICAL FACTORS

Vijayanagara sculptures and paintings, Pārvatī is so sullen that Śiva has to caress her chin and try all his wit to appease her anger. The bronze representation from Vaidīśvaran-koyil (Tanjore District) and the stone sculpture from Tārāmangalam (Salem District) of about the fifteenth or sixteenth century represent this later iconographic development. A painted representation of this phase is found in one of the panels adorning the ceiling of the *ardhamandapa* (antechamber) of the temple of Vīrabhadra at Lepākshī (fig. 40). Here the eagerness of Gaṅgādhara to appease Pārvatī looking downcast, consistently with the dictum of the *Śilparatna*, is clearly represented. This continues in the later centuries. Sculptures of Gaṅgādhara thus provide an excellent example of the change of iconographic concepts through the centuries. Here the change is affected by the time-factor, as it is by the geographical factor in the case of Naṭeśa.¹

GLOSSARY

- Khatakā-mukha* : position of the fingers of the hand to hold something, generally a lotus or lily but often without it, yet suggestive of it.
Yajñopavīta ; *vastra-yajñopavīta* ; *muktā-yajñopavīta* : the sacred thread ; the upper cloth itself worn like the usual sacred thread ; composed of pearls instead of thread.
Suvarṇa-vaikakshaka : ornamental golden cross-band worn across the chest.
Udara-bandha : stomach-band.
Katisūtra : waist-cord or band.
Karaṇḍa-mukuta : crown so called because it resembles a pile of pots.
Jaṭā-mukuta : crown composed of locks of hair.
Kartarīmukha : position of the fingers of the hand all straight except the ring-finger and thumb, the fore and middle finger slightly apart (resembling a pair of scissors) and intended to hold aloft some weapon or attribute.
Tripatāka : position of the fingers of the hand all straight except the ring-finger and thumb.
Keśa-bandha : loose knot of dressed hair of women.
Dhammilla : richly-dressed feminine coiffure.
Yoga-paṭṭa, *ardhayoga-paṭṭa* : band entwining back and both the legs for maintaining a seated position usually in *yoga* ; similar band but for only one leg, the other being at ease.
Paryāṅka-granthi-bandha : band tied to entwine the legs, same as *yogapaṭṭa*.
Ardha-paryāṅka : pose with one leg bent and the other free.
Āyudha-puruṣas : personified weapons.
Samabhaṅga : straight or erect pose without flexions.
Urdhvaliṅga : upward *membrum virile* suggesting control of senses.
Ālīdha : warrior pose with right leg bent forwards and left leg backwards.
Chatura : dance pose showing both legs somewhat bent but with right foot completely on the ground and heel of left foot somewhat raised.
Kari-hasta : position of hand held slantingly straight in dance.
Lalita : dance pose with the position of legs in *chatura* reversed.

¹ The photographs illustrating this article have been obtained through the courtesy of the Department of Archaeology, Government of India ; the Archaeological Departments of Mysore and Gwalior ; the Museum of Archaeology, Mathurā ; Government Museum, Madras ; and British Museum, London.

THE STONE INDUSTRIES OF THE HOLOCENE IN INDIA AND PAKISTAN

By D. H. GORDON

Colonel D. H. Gordon, well-known for his researches in the field of Indian protohistory and early historical archaeology, reviews and re-examines here the microlithic and neolithic industries of India, a phase of which, viz. the microlithic industry near Bombay, has been dealt with by Commander K. R. U. Todd elsewhere in this journal (above, pp. 4 ff.). The article is a welcome addition to the existing literature as an attempt at systematizing our present knowledge and bringing together the hitherto unrecorded finds. A perusal of the article will show that 'many people', including the author himself, 'have done a great deal'; but much still remains to be done.

INTRODUCTION

AS a result of research in recent years, a stock-taking of our knowledge of the protohistoric stone industries of India and Pakistan would appear to be timely. By protohistoric stone industries are meant all those artefacts of stone of mesolithic or neolithic type found in or associated with relatively recent deposits of the Holocene period. It must be emphasized from the start that words such as mesolithic, neolithic and chalcolithic carry with them no implication of dating, and are almost always used as recognized terms of convenience unless a suggested dating is definitely stated.

It is evident that by some form of diffusion, the character of which is not fully known, there has been a world-wide and almost uniform succession of stone-shaping techniques, of which in this paper we shall be dealing only with the most recent, namely microliths and ground and polished stone axes and objects of culture which may be associated with them. It will be necessary first of all to examine the evidence available to establish an upper limit for the mesolithic in the sub-continent, the overlap of microliths, pottery and ground stone axes has then to be considered and finally the lower limit of microliths and ground stone axes and the advent of metals. Considerable overlapping will be found to characterize the use of stone, pottery and metal.

The terms mesolithic, neolithic and chalcolithic have increasingly and more correctly come to stand for cultural modes of life rather than to be descriptive of material techniques, and these modes of life in a vast country like India have existed, and to some extent continue to exist, side by side. It was the use of smelted iron that made metal tools and weapons comparatively common, those of copper and bronze being without doubt the possessions of leading warriors and wealthy craftsmen or merchants, the common man using stone.

THE UPPER LIMITS : THE EVIDENCE OF STRATIFICATION

So far only one site has been recorded where there is a complete directly superimposed sequence of stratification from very early core implements up to microliths, that of Khandivli about 21 miles north of Bombay, discovered by Comdr. K. R. U. Todd. This site showed Clactonian and Acheulian types succeeded by a flake blade industry and two blade and burin industries, of which the more developed from the upper clay could from its size and style be called proto-microlithic. Associated with the recent surface-soil was a true microlithic industry similar to that found at many sites along the coast, such as Hog Island, Kasu Shoal, Janjira, Dabholgo and Jaigarh (Todd, 1932).

THE STONE INDUSTRIES OF THE HOLOCENE

At Marve, on the coast three miles to the west of Khandivli, Todd found a microlithic industry with drills, lunates, blades and burins in agate, chalcedony and chert, the normal material for microliths in most parts of India. With these he found sherds of pottery and two hearths ; as the total depth of deposit was however only six inches from surface to underlying rock, it is difficult to be sure of these features being contemporary. Todd considered the bulk of these microliths, with the exception of a few more weathered specimens from the bottom of the deposit which may be contemporary, to be more recent than those from Khandivli surface.

From these sites therefore one obtains a sequence of a blade and burin industry of small size, which is practically speaking microlithic, from the upper clay, and a true microlithic industry from the surface at Khandivli linking with a more developed microlithic industry at Marve in actual and possibly cultural association with pottery of rather primitive appearance (Todd, 1939, esp. figs. 1, 31-4, 37 and 38).

The cultural succession worked out by Mr. M. C. Burkitt from material provided by Mr. L. A. Cammiade (Cammiade and Burkitt, 1930, esp. pls. V and VI) is somewhat more inferential than the Khandivli-Marve sequence, three separate localities being involved—Giddalur, Nandi-Kanama Pass and the Lower Godāvarī.¹ This sequence is divided into four series of which only 2 to 4 interest us here, Series 2 Giddalur followed by series 3 Nandi-Kanama Pass and series 4 Lower Godāvarī. Some of the tools of series 3 can only be classed as microliths and it is likely that this series is equivalent to Khandivli specimens, the lower part to the large flake tools from the top of the upper gravel, and the upper part to those from the upper clay, the microlithic tools. The equation of these sites may be tabulated as follows, the Khandivli implement layers being numbered from the bottom upward, three early ones being omitted :—

<i>Cammiade and Burkitt</i>		<i>Todd</i>
Lower Godāvarī, series 4	...	Khandivli surface (7) and Marve.
Nandi Kanama Pass, series 3	...	Khandivli.
Upper	...	In Upper Clay (6).
Lower	...	On top of Upper Gravel (5).
Giddalur, series 2	...	On top of Middle Clay (4).

When many years ago Carlleyle excavated the Marahna (Morhana) Pahār cave shelter, probably somewhere in Rewa State (now in Vindhya Pradesh), he found microliths stratified over earlier and larger flake implements (Brown, 1889), which is yet another instance that in India as elsewhere there was a late Upper Palaeolithic blade and burin industry corresponding to Late Magdalenian, followed in succession by larger less geometric and smaller more geometric microliths.

In his expedition in 1949 Professor F. E. Zeuner found microliths near Tuticorin in a geological section which suggests that some of them may be of considerable antiquity.

De Terra in his researches into the Narmadā sequence found microliths of chert and chalcedony in the basal gravel and sands underlying the alluvial regur at Janakpur and Jhānsī Ghāt. Here he says there was an ' assemblage characterized by the absence

¹ The lower Godāvarī is taken as a term of convenience. These microlithic sites found by Cammiade stretch from the north-east to the south-west across the line of the Godāvarī and follow the foothills of the Eastern Ghats through the revenue divisions of Polāvaram, Chodavaram and Yelāvaram of the Godāvarī Agency Tracts. They are in no way specifically connected with the river itself.

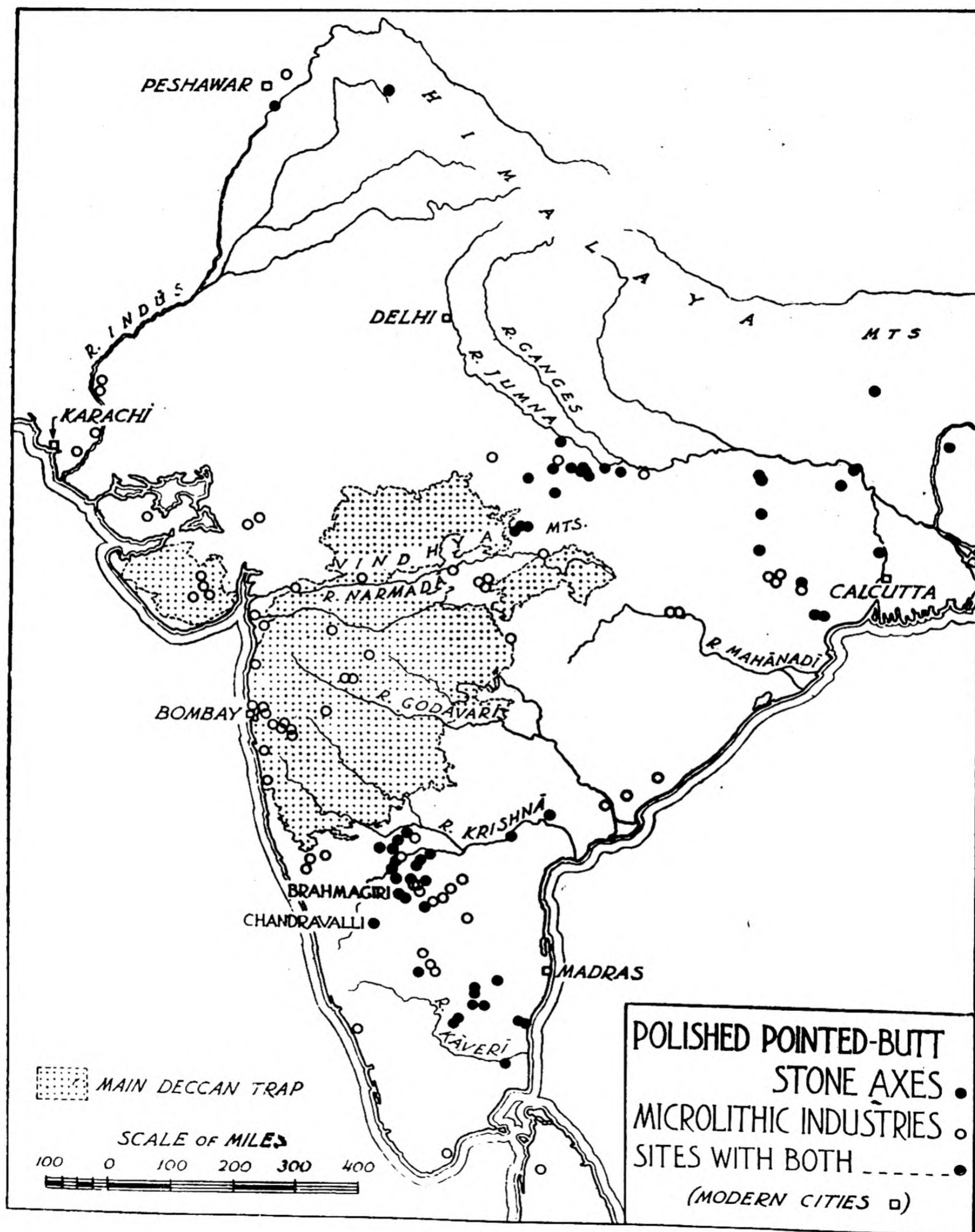


FIG. I

THE STONE INDUSTRIES OF THE HOLOCENE

of hand-axes or large cores and by the dominance of small blades and scrapers. The tools are made of flint or jasper, clearly indicative of a change both in technique and choice of material. We believe they represent a proto-neolithic or later industry which may have flourished in relatively recent times' (De Terra and Paterson, 1939, p. 320).

We do not yet have the necessary knowledge to date with any degree of accuracy the earliest microlithic or proto-microlithic industries, but geologically they are all certainly within the Holocene. Dating is a hazardous business but it would appear likely that for these industries, as indicated by upper Nandi Kanama, Khandivli 6 and the upper hard pan of Tuticorin, we must in the roundest of numbers be thinking in terms of about 8000 to 6000 B.C. as the outside limits either way for their appearance.

THE DISTRIBUTION AND TYPOLOGY OF MICROLITHS

A glance at the map (fig. 1)¹ will show that the distribution of microliths covers roughly speaking the whole of India and Pakistan. Blank areas occur due to a variety of reasons, the chief one being lack of exploration. Whereas the intensively tilled lands of the Panjab and the waste of the Great Indian Desert may continue to be drawn blank, the country between the Krishnā and the Mahānadī including the whole of the middle Godāvarī should produce something, so also the Vindhya Range proper, that is the country from Mhow to Sāgar, where nothing has yet been recorded.

The West Coast, because of the researches of Mr. G. E. L. Carter, Mr. A. V. Pandya, Dr. H. D. Sankalia, Comdr. K. R. U. Todd and myself, is well filled with recorded sites. From the Bombay-Poona-Ahmadnagar area, where, I am certain, sites could be found in even greater numbers, a belt of microlithic sites stretches across the centre of India along the Narmadā and the Tāptī, with extensions branching into Gujarat on the north (possibly due to coastal spread), and into northern Hyderabad on the south, to leave traces at Fardāpur (Ajantā), Ellora and Aurangābād. This belt includes the sites found by Carlleyle and Franks in Rewa, Bāndā and Mirzāpur, those also of the rock-shelters of the Kaimūr Range and the River Son and those in the vicinity of Raigarh, such as Singhanpur and Kabrā Pahār.

Yet another series of sites is located in the area including the Belgaum District (Barapedi Cave, Piranvadi, Chandargi : Gordon, 1938 B), Dhārwar, Anantapur District (Havaligi Hill and other sites explored by Bruce Foote) and in the Raichūr District (with many sites in the area Māski-Lingsugur-Raichūr). In addition microlithic sites have been found round Bangalore, in District Singhbhūm (South Bihar) on the line of the copper seam from five miles north of Chakradharpur eastward to Ghāṭsilā on the Subarnarekhā, also in Pakistan at Tharro and Jungshāhī in Sind (not in association with any of the Indus painted pottery cultures) and in the north-west at the Jamālgarhi cave, north-east of Peshawar (Gordon, 1945 A, p. 16 and pl. I), and stray finds in the general vicinity of Rawalpindi and Campbellpur.

The typology of Indian microliths does not present the range found in some European countries, but the types represented in the North African Upper Capsian, Oranian and Sebilian and in the Natufian of Palestine are almost without exception to be found in India. Todd considered, from their form, patination and state of preservation, the coastal microliths to be of earlier date than those of the inland sites, but in stating that these latter consist of lunates, blades and cores only (Todd, 1939, p. 270) he is wrong.

¹ This is the same map as that published in *Ancient India*, no. 4 (1947-48), p. 297, with a few additions.

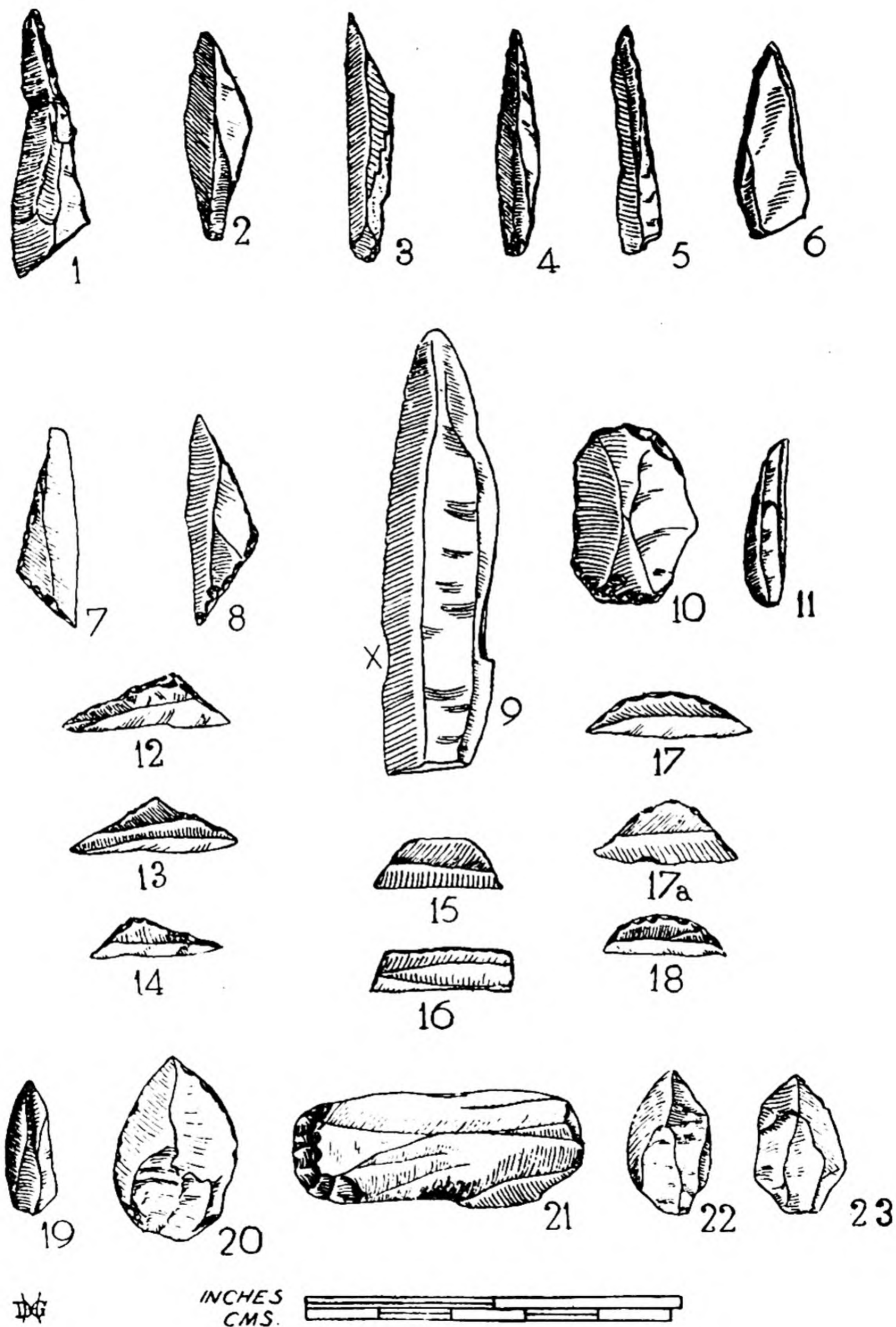


FIG. 2. *Microliths from Pachmarhi, Mahadeo Hills: 1, 2, 7, 8, 12-14, triangles; 3 and 11, backed blades; 4-6, worked points; 15, trapeze; 16, trapezoid blade; 17-18, lunates; 10 and 21, end-scrapers; 19, 20, 22 and 23, chip points with slight retouch; 9, large blade, with retouch for finger-grip marked X*

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This is due no doubt to the fact that very few illustrations of Indian microliths have been published and so there has been very little upon which to form an opinion, which applies in equal measure to Todd's own illustrations which probably show only a fraction of what he found. On these the microliths of Khandivli and Marve make a very poor showing compared with those of the Franks collection in the British Museum from Bundelkhand and Baghelkhand and my own large collection from Pachmarhi and Jabalpur (figs. 2 and 3). It may well be that the coastal microliths are older, but their range of types is different from and rather larger than those found inland.

Before going any further it will be as well to clear up one or two points. In dealing with microlithic industries it should be recognized that this name is a convenient label. Relatively these artefacts are small, but whereas some are very minute, others may be two or three inches in length and all belong to this particular phase of stone culture. It is felt by many, or so it has always appeared to me, that unless a flake shows signs of working it is not a true artefact but just a flake, a waste product on a workshop site. In many cases this is true, but a large number of unworked flakes show signs of use, and, as will be stressed later, the use of unworked flakes became normal in chalcolithic times.

The burin, particularly that class of these objects known as the micro-burin, would appear to have been scarce if not wholly absent from the microlithic industries of India and Pakistan. The so-called burin stroke, which detaches an oblique flake from the end of a blade, should be distinguished from a partially detached side-flake, the result of an unintentional snapping of a flake at half or quarter length instead of it being cleanly detached for the full length of the core. Points which could be called borers or gravers seem, from specimens found, to have been formed by snapping off a fragment obliquely from both sides of a thin blade so as to form a point, and it is doubtful whether the resulting object can be called a burin. Little arrows inserted however persuasively into an illustration do not necessarily make the object illustrated a burin.

The microlithic industries of the coast are actually more simple and somewhat cruder than some found inland and the only type that they may possess which the inland ones definitely do not is the burin. The lunate and straight and crescentic backed-blades are the commonest worked artefacts found at nearly every site. End, core and disk scrapers are less common but seem to have a wide distribution; triangles, reasonably plentiful at Pachmarhi and Jabalpur, are on the whole scarce elsewhere, true trapezes (a not very happy term of convenience) as distinct from somewhat trapezoid crescents are very rare. In the Franks collection, however, no less than ten trapezes appear in a relatively small selection of good artefacts, two were found by me at Jabalpur and two at Pachmarhi, one of them by Hunter. Apart from these I have not been able to trace any either in museums or by mention in any of the literature dealing with this subject. Points appear to be of two types, the somewhat uncommon fabricated point, formed by working the two sides of a flake blade, and the small chip point of ovate form with a central ridge. Tanged arrow-heads are extremely scarce, only two or three specimens being known. The following table gives a clear idea of the varieties found at the main sites :—

	Backed-blades straight	Backed-blades crescentic	Lunates	Disk scrapers	End scrapers	Worked points	Chip points	Triangles	Trapezes	Burins	Borers
Jamālgarhi ..			×			×	×				
Langhnāj ..		×	×	×			×				×
Rājpiplā ..		×	×								
Pachmarhi ..	×	×	×	×	×	×	×	×	×		×
Jabalpur ..	×	×	×	×	×	×	×	×	×		×
Bāndā and Mirzāpur	×	×	×		×	×		×	×		
Dhalbhūm ..	×	×	×								
Khandivli ..	×									?	×
Marve ..	×		×			×				×	
Dighi Hill ..	×	×	×	×				×			
Belgāum ..	×		×		×						×
Nandi Kanama ..		×	×								×
Lower Godāvari ..	×	×	×		×	×		×		?	
Jalahalli ..	×	×	×	×	×	×					×
Bangalore ..		×	×	×	×						

As an indication that the number of sites recorded in any particular area depends probably on the amount of exploration that has been carried out, one may instance the 129 microlithic sites¹ recorded by Cammiade in the region of the Lower Godāvari (Cammiade, 1924, pp. 103-5). These sites produced lunates, straight and crescentic backed-blades, triangles, worked points and scrapers. Adze and gouge-heads are described, but lacking any illustration these tools are difficult to visualize. Trapezoid axe-heads are mentioned and would appear to be the eastern straight-sided type with a semi-rectangular section, and with them can probably be grouped a small shouldered axe of Burmese type. In three instances the microliths are recorded in relation to a find of palaeoliths, at

¹ This list of sites contains some sites, such as 50. Buddhist stūpa, Rāmachandrapur and 84. Kumāravaram (pottery, gold coin etc.), which were probably recorded as sites of archaeological interest and have no connection with microliths. A number of misprints and some incomprehensible abbreviations make some of the references difficult to follow.

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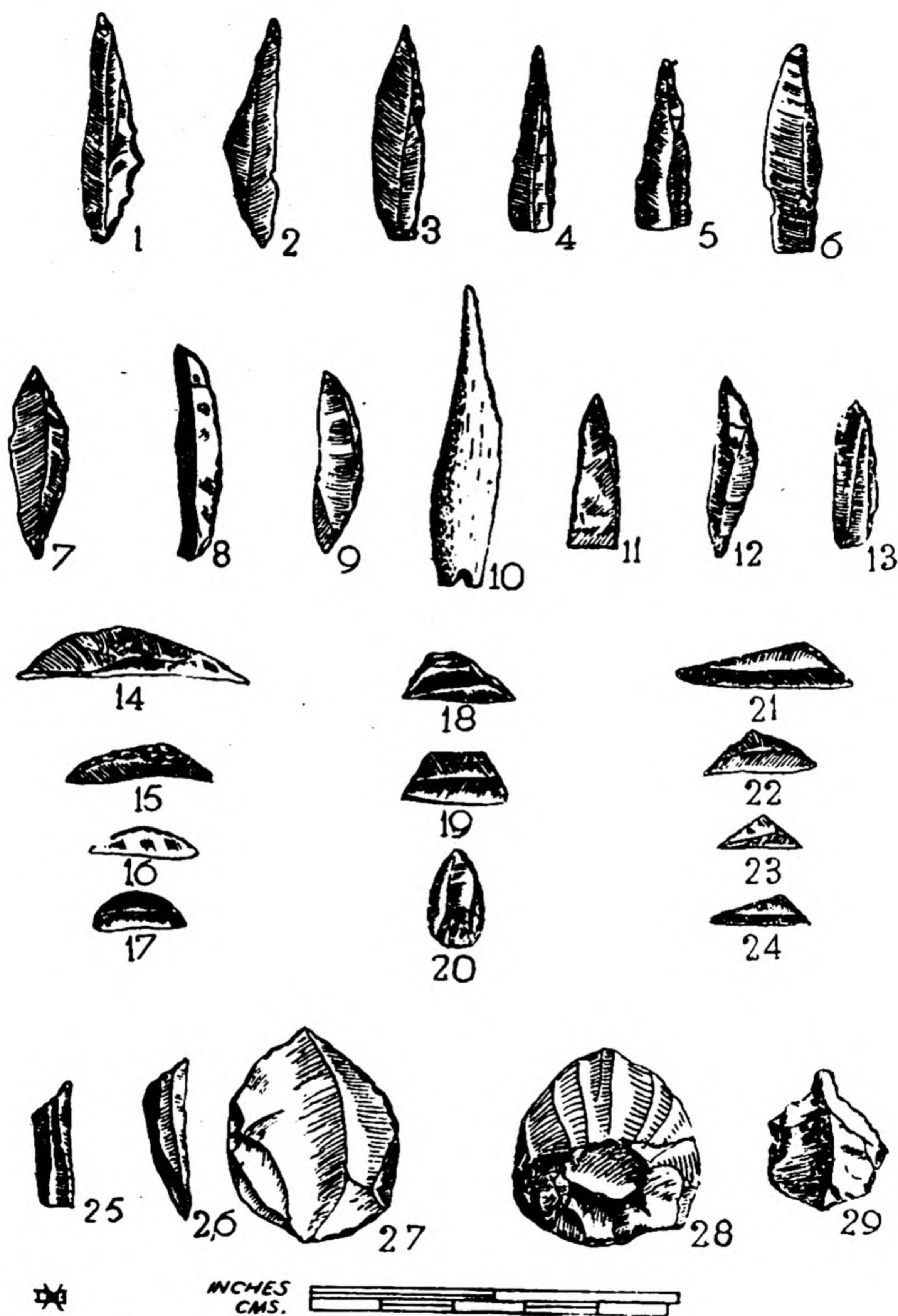


FIG. 9. *Microliths from Burra Simla site, Jabalpur : 1, 2, 21-24, triangles : 3, 6, 8, 13, backed straight blades ; 7, 9, 12, backed crescentic blades ; 14-17, lunates ; 18 and 19, trapezes ; 4, 5, 11, 20, worked points ; 28, core-scraper ; 29, awl ; 25-27, retouched artefacts ; 10, bone awl*

Kannuapuram on the surface above palaeoliths, at Buttayagudem in red-soil above palaeoliths and at Sapper's Hill, Rajin, at the same level as palaeoliths. These can respectively be linked quite clearly with Nandi Kanama, the surface find being series 4 and the others upper and lower series 3. Again we see that the start of the mesolithic-microlithic phase is connected with the close of the upper palaeolithic.

Material to a large extent determines the quality of the artefacts produced. Flint, chert, chalcedony, agate and any similar fine-grained silicates make most attractive tools. On the other hand the coarse-grained quartz found in most areas, but which is almost the only material available at Bangalore, Jalahalli and Dhārwar makes comparatively clumsy tools. To a certain extent also the material would appear to influence the size of the artefacts. While recognizing that the use of small tools was a world-wide phase in the evolution of stone cultures, it is certain that, when the use of large quartzite implements was succeeded by that of microliths, those who lived in the neighbourhood of Belgāum, Dhārwar and Bangalore were restricted by the material available to very small artefacts, most clearly revealed by the minute micro-cores found at some of these sites.¹

MICROLITHS AND POTTERY

Seeing that quite a well-argued and possibly well-founded case has been made for Upper Palaeolithic pottery in Europe (Reid Moir, 1935), it is surprising that investigators have been on occasion so reluctant to accept the evidence of pottery in India being a product contemporary with the manufacture of microliths. It has been indicated that certain microliths may well date back as far as c. 8000 B.C., but this did not prevent this stone-working technique from continuing in parts of India up to early historic times. After all what is 8000 years compared with the vast geological periods which mark the development of Palaeolithic cultures from the crude stone tools of the early Pleistocene.

Various sites in India provide evidence for the contemporary use and production of microliths and pottery. The most important of such sites are those of Hirpurā and Langhnāj in Gujarat, which were excavated by successive Gujarat prehistoric expeditions under the direction of Dr. H. D. Sankalia. From the table given in Appendix A (below, p. 86), compiled from fig. 8, excavation tables of Hirpurā and Langhnāj, pp. 65-100, and Appendix II, Excavated Finds, in Dr. Sankalia's report (Sankalia, 1946), it is evident that there was a very definite overlap in the use of microliths and pottery. In Pit I, Mound I, at Langhnāj fragments of pottery were found as low as between 4 and 5 feet below surface, but it is doubtful whether we can rely on any of the few sherds below 3 feet below surface as being significant. Bearing in mind however the fact that sherds do exist below 3 feet at Langhnāj, let us concentrate on the first 3 feet at both sites. The bulk of the microliths came from between 2 to 4 feet below surface in which horizon pottery exists though in small quantities, particularly below 3 feet. The quantities of flakes however also fall off abruptly after 5 feet, and, though found between 8 and 9 feet in Pit I Mound II Langhnāj, there are in all only 50 flakes recorded below 5 feet in Pits I and O Hirpurā and Pit I Mound I and Pits I and II Mound II Langhnāj all put together. In

¹ The typology of the known artefacts from the main microlithic areas and sites is as given in the table of types. I am certain, however, that constant careful search has a considerable bearing on the variety of types recorded, particularly where specimens are at all plentiful. Sankalia mentions triangles, semi-triangles and trapezes from Hirpurā and Langhnāj, but as all such are unworked and apparently only fortuitously of these shapes, they cannot be included as intentional artefacts (Sankalia, 1946, p. 133).

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levels surface to 2 feet, where pottery is in definite direct association with microliths, more than a total of 550 microliths were recovered.

The excavations of the second Gujarat prehistoric expedition were carried out on Mound II Langhnāj, which for no very sufficient reason was renamed Mound I. The results appear from the preliminary report in the *New Indian Antiquary* to have been somewhat different to those obtained by the first expedition, due probably to chance (Sankalia, 1944). No actual record of finds has been given at this stage and so it is not yet possible to get a proper review of the material found at each level. In Pit I of the new dig apparently little was found in the top 4 feet, natural soil being reached at 6 feet below surface and the greater part of the finds of microliths and bone tools concentrated between 4 and 5 feet, thinning out below 5 feet. This does not conform with what was found in any of the 1942 pits, where the bulk of the microliths appeared between 2 and 4 feet. Two sections were also dug in a long trench 6 feet broad. Here pottery, which was regarded as modern, was found by the excavators in the first 3 feet along with 'very few micros', and the bulk of the microliths appeared between 3 and 5 feet accompanied by portions of a quern and pestle.

The greater part of the pottery from Mound I Pit I and Mound II Pit I Langhnāj seems to have been coarse brown ware of varying degrees of thickness. One of these pieces has a thick red wash, but there is only one piece of true red ware, no. 79 from Mound I. The remaining sherds from these pits are of black ware. Pit II in Mound II produced a number of red ware pieces and also some black ones. The description of the pieces indicates that they must be almost identical with pottery found in the rock-shelters of the Mahādeo Hills, where black pottery predominates together with brown pottery and red pottery which has a considerable degree of brown staining.

There cannot be any doubt that we have here evidence of a microlith-using people who came to know both agriculture, as they had a quern and a pestle to pound their grain, and also pottery. From a study of the excavation-records certain points emerge which suggest possibilities. A soft yellowish hand-made pottery with a smoky core is mentioned and the pottery below 3 feet below surface at Langhnāj appears to be coarse and possibly hand-made. Sankalia also mentions that both Hirpurā and Langhnāj have produced hand-made 'sun-baked' pottery (Sankalia, 1946, p. 138), though it is probable that the poor quality of these pots is due to bad firing. It is possible that these earlier pots were both few and perishable, which would account for the scarcity of fragments below 3 feet. The quern was discovered at a depth of about 4 feet which is below that at which pottery has been found in all but the smallest quantities, and therefore it is possible that some primitive form of agriculture was practised before pottery came into use. At these sites it is possible therefore that we have evidence of a microlith- and bone tool¹-using people being introduced to agriculture and pottery and the original mesolithic food-gatherers becoming neolithic food-producers, albeit probably on a very restricted scale.

Other sites serve to bear out this evidence of the contemporary use of microliths and pottery. Rock-shelters investigated at Pachmarhi by Dr. G. R. Hunter and myself have for the most part very little soil above rock floor-level within the limits of the overhang. A small amount of digging done by my wife and myself at the Dorothy Deep

¹ Bone tools are very scarce in India. Apart from those found at the Gujarat sites, bone tools have been found by Foote at Billa Surgam (Foote, 1916, p. 191), by myself a bone awl at the Burra Simla site at Jabalpur (Gordon, 1945 B, pp. 28-29), by De Terra four bone awls and by myself a bone chisel at Burjhāma, Kashmir.

shelter, Pachmarhi, produced similar results to Todd's digging at Marve. Digging over an area of 9 by 3 feet, in the upper 7 inches though there were 11 flakes we found no pottery, between 7 and rock at 11 inches we found 16 flakes and 3 potsherds. These were respectively black with polished slip, brown also with polished slip and thin brown. The depth of these excavations was so small that they do not of themselves provide very reliable evidence for the contemporary use of pottery and microliths.

Dr. Hunter however dug this Pachmarhi shelter to a maximum depth of 51 inches.¹ These excavations showed that flakes were in good quantities as high up in the section as 3 inches below surface, but that, except for certain areas, there was very little pottery below 18 inches. The terracotta horse, of which three fragments, head, saddle and tail with crupper were found, came to light between 20 and 24 inches in a part where pottery ran down to much the same level. The following tabulation of areas taken by me from Dr. Hunter's records in Pachmarhi in 1934-35 gives a clear indication of the mixing of flakes and pottery and the way the latter disappears in the lower levels.

			Sherds	Flakes	Implements
Area 8 (surf. to 4 inches)	...	...	17 ($\frac{2}{3}$)	70 ($\frac{1}{3}$)	7
„ 20 (surf. to 8 inches)	...	...	26 (1)	70 ($\frac{1}{3}$)	2
„ 24 (3 to 5 inches)	...	...	13 ($\frac{1}{2}$)	52 ($\frac{1}{4}$)	4
„ 6 (6 to 10 inches)	...	...	26 (1)	35 ($\frac{1}{8}$)	Nil
Areas 26, 27 and 30 (8 to 16 inches)	...	...	6 ($\frac{1}{4}$)	210 (1)	11
Areas 14 and 19 (10 to 18 inches)	...	...	39 ($1\frac{1}{2}$)	84 ($\frac{2}{5}$)	1
Area 37 (20 to 26 inches)	...	...	1	210 (1)	11

In all, including 8 and 20 shown above, twelve areas were excavated to a maximum of 8 inches, with one exception, 32B, where the depth attained was 11 inches. They are 2, 7, 8, 9, 13, 20, 21 and 22, 29, 29A, 32, 32B and 33. According to Hunter's catalogue flakes in some quantity were found in all, pottery in all but one, 29A, and implements in eight (2, 8, 9, 20, 22, 32, 32B, 33). The most interesting areas were 8 and 20; area 7 produced 5 flakes and area 21 and 22 produced 25. There is no detailed record of the other areas, but the intermingling of flakes and pot-fragments is clear.

The general area A to G, 19 to 14 feet, which was taken down to 51 inches below surface, the maximum depth at which bedrock was reached, gives a very clear picture of the stratigraphic sequence. This section includes three areas which appear in the above table. The table of this sequence given below, p. 75, should be read in conjunction with the diagram and detailed explanation given in Appendix B (p. 86).

This makes the stratigraphical relationship between flakes and pottery even clearer. There are on the surface and in the first inch or two of the soil of this shelter many modern sherds as it has been visited a great deal during recent years, but these can be distinguished quite easily from the ancient pottery found lower down—mostly a black ware—though there are occasional fragments of a whitish pottery of thick section, also ancient.

It will be seen that the Pachmarhi evidence follows that of Langhnāj very closely. The larger number of flakes occur where there is little or no pottery, but there are far too many flakes in the levels where pottery is found in significant quantities for it to be possible for these to be accounted for by displacement due to floor-disturbance. The discovery

¹ The interim and final reports produced by Dr. Hunter in the *Nagpur University Journal*, no. 1 (1935) and no. 2 (1936), are extremely hard to follow. It is hoped that this interpretation aided by the explanatory Appendix B (below, p. 86) will make the results sufficiently clear.

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of pottery in association with microliths at Marahna (Morhana) Pahār by Carlleyle helps to strengthen the evidence (Brown, 1889). The pottery and flakes found by De Terra at Sombur (De Terra & Paterson, 1939, pp. 83, 84 and 103) and by De Terra and Paterson in alluvial deposits on the banks of the Jhelum (*ibid.*, p. 233), also the finds at Burjhāma and Pāmpur (*ibid.*, pp. 233-4) lead Dr. De Terra to state : 'In all these places it was certain that the flakes are associated with pottery-bearing layers of either neolithic or historic date', but he qualifies this by saying : 'Notwithstanding these observations, it is still possible that flakes found in the lowest Jhelum terrace represent a late palaeolithic or proto-neolithic culture' (*ibid.*, p. 233). On balance a mesolithic merging into a neolithic pottery-using culture, conforming to the pattern found elsewhere in India, seems to fit the probabilities. The evidence of Uchālī, west of Naushahra in the Salt Range, West Panjab, though not presented very clearly, seems to bear this out, though it may be that the burials with funerary deposits are intrusive in the implement-bearing layers and much later (*ibid.*, pp. 277-78, fig. 179).

THE PACHMARHI SEQUENCE

Depth	Bone fragments	Pottery	Flakes	Implements	Remarks
Level (a)—s. to 6 inches ...	A few	46 ($1\frac{5}{8}$)	35 ($1\frac{1}{8}$)	Nil	There is no report on 2 out of 4 areas. Important area 18 has no detailed report. Area 45 has no detailed report.
Level (b)—6 to 10 inches ...	Yes	32 ($1\frac{1}{4}$)	70 ($\frac{1}{3}$)	1	
Level (c)—10 to 18 inches ...	Yes	39 ($1\frac{1}{2}$)	84 ($\frac{2}{5}$)	1	
Level (d)—18 to 26 inches	Yes	5 sherds (more in area 18)	336 ($1\frac{3}{5}$)	16	
Level (e)—26 to 31 inches	Yes	5 small frags. (+ any in area 45)	140 ($\frac{2}{3}$)	11	
Level (f)—31 to 51 inches ...	Nil	Nil	21 ($\frac{1}{10}$)	2	This level is mainly sterile.

In the rock-shelters of the Mahādeo Hills from Tāmiā on the east to just south of Seoni-Malwa on the west a considerable number of rock-paintings have been found. The succession by superimposing, linking by certain types of each series to its predecessor and a rough dating to cover the whole has been carefully worked out on the evidence of 47 separate shelters (Gordon, 1936 and 1940). The latest of these paintings are probably of the tenth century A.D. and it is unlikely that any are earlier than the seventh century B.C., but certainly not beyond the limits of the first millennium, the continuance from one style to another being too definite to allow of a greater period of development of much more than 1,500 years from first to last.

Microliths are found in and around rock-shelters with or without paintings. The pre-pottery microliths are older than the paintings, which, back to the earliest series, show obvious metal arrow-heads.¹ It is probable that microliths were still in use up to the time when, to judge by the paintings, a hunting people gave place to a pastoral warrior community about the first century A.D. The rock-paintings of Singhanpur and Kābrā Pahār, Raigarh State (Madhya Pradesh), have been connected with the earlier paintings of the Mahādeo Hills and they too are probably contemporary with part of the microliths found in their immediate vicinity (Gordon, 1940, pts. 3 and 5), the same applying to the shelters, paintings and microliths found in the valley of the Son (Ghosh, 1932).

At Marahna Pahār, where Carlleyle², as has been mentioned above (p. 65), found microliths stratified over larger artefacts, paintings exist of men and animals in red ochre, and 'rude pottery, roughly and simply ornamented by strokes' was found in association with the microliths; the whole being in close agreement with what is found in the Mahādeo Hills, plus the additional factor of the stratified earlier types. J. A. Brown in the same paper (Brown, 1889) mentions a most suggestive find of microliths in a grave as having been made by Carlleyle, but gives no details of this burial, either of the body or of any other articles which may have accompanied it. It is possible that this burial may have been similar to that unearthed by Hunter in a cave-shelter in the Jambudwīp Nullah, Pachmarhi, where the body was apparently packed round with a large number of microlithic flakes and artefacts.

In addition to the above there are instances of pottery being present in proximity with microliths under circumstances which are not proof positive of their contemporary use. Such finds include pottery in the Mahādeo Cave, Pachmarhi, and in the Barapedi Cave, Belgāum (Gordon, 1938 B), both well off the beaten track and very hard to find, with no indications of use in recent times, and the pottery found by Mr. A. V. Pandya at the Narmadā sites of Sanjroli, Akteswar and Gardeswar in Rājpiplā on the right bank of the river stretching continuously for four miles downstream from the point where the Dhamni joins the main river.³

Cammiade also found a certain amount of pottery on the microlithic sites of the Lower Godāvarī, and he mentions that microliths were found with funeral urns at Bodalur and Adatigala and also 'in suspicious proximity to urns of a proto-historic period at Dowleishvaram near the apex of the Godāvarī delta' (Cammiade, 1924, p. 101). Other finds of flakes, artefacts, scrapers and cores made by Bruce Foote in association

¹ In this connection attention may be drawn to the reproduction given in fig. 10 of Gordon Childe's *New Light on the Most Ancient East* purporting to be of a painting in the Singhanpur shelter. It is apparently intended to be the small animal below and to the left of the large animal in the hunting scene, as there is no other painting in the shelter even remotely resembling it. I have seen these paintings *in situ*, which are very accurately depicted in Manoranjan Ghosh's *Rock-paintings and other Antiquities of Prehistoric and Later Times*, Memoir of Archaeological Survey of India, no. 24 (1932). The source from which this figure was derived is wholly inaccurate, the scale being wrong, the figures themselves differing in the original and, what is most important of all, there being no harpoon-like objects painted on the animal's side. It is doubly unfortunate that this figure in Childe's book is immediately followed by one showing two Natufian bone harpoons of similar appearance to the ones shown on the animal. As most misleading ideas of palaeolithic connotations could be formed on the strength of evidence which does not exist, the complete absence of these harpoon-like objects cannot be too strongly insisted upon.

² This is Mr. A. C. Carlleyle, who was assistant to General Alexander Cunningham. His name is quite frequently spelled Carlyle.

³ Communicated to me by Mr. A. V. Pandya in a private letter.

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with pottery at Patpād and Tsanagundla Drug will be dealt with below (p. 84). Taken as whole there is ample evidence to show that microliths persisted into a period when pottery was common.

MICROLITHS, STONE AXES AND THE ADVENT OF METAL

In India microliths were the prominent cultural feature of those communities that pursued both the mesolithic hunting and food-gathering and the neolithic hunting and food-producing modes of life. The peasant peoples of the Zhob in Pakistan used microliths that are indistinguishable from those of the Indian Central Provinces, and so did the early inhabitants of Sind. With the advent of the urban chalcolithic way of life, true microliths disappeared in the parts affected by this culture, though in the wilder forest regions they were to continue in all probability almost down to the present day.

With the chalcolithic cultures there came into use a wholly new tool—the axe of stone or copper. Polished stone axes have always been regarded as the hallmark of the neolithic, but it is doubtful whether this applies to India which is not alone in this respect. At the Alishar Hüyük in Anatolia no stone axes were found in the level Alishar O where copper was already in use along with blades, scrapers, cores and flakes of chalcedony, flint and obsidian, including ribbon-flake blades as used in the Harappā culture, the earliest trapezoidal flat axe of stone with one cutting edge (e 413) being found in Alishar IA, this type continuing to be used until Alishar IV, the post-Hittite and Phrygian period (Osten, I, 1937). In the same way, at Tepe Hissar in northern Iran, which was influenced by Anatolia to a greater degree than either Giyan or Sialk, in Hissar I, when copper was already known, polished stone axes are scarce, they are fairly plentiful in II and numerous in III which is contemporary with the Middle Bronze Age.

With the arrival of the chalcolithic economy the microlith disappears and is replaced by the parallel-sided ribbon-flake blade, found in many chalcolithic sites throughout western Asia and typical of the Harappā culture of the Indus. From blocks of flint obtained from the Rohri-Sukkur region large prepared cores were made from which blades were struck, many up to $3\frac{1}{2}$ or even 4 inches in length. These were seldom retouched; out of 1,408 blades examined by my wife and myself at Mohenjo-daro only 58 showed any form of working and of 350 at Harappā there was a somewhat higher percentage of 46 worked blades. It would appear that this form of mass produced blade was the household knife of the community. There is none of the familiar microlithic types—the lunate, the triangle and the scraper. A few of these blades are worked down both sides to form a point, some are backed and some notched at the base, and there is a special artefact of triangular section with deep lateral scars along one or two of the faces which is found at most Harappan sites (Gordon, D.H. and M.E., 1940).

There are no ground and polished stone axes, in fact no stone axes of any kind to be found in Sind or the Indo-Iranian borderland; here the chalcolithic tool was the copper flat axe which in various forms was eventually diffused over the whole of northern India. There is as yet no evidence for any extension of the Harappā culture eastward of the site found at Kotlā Nihāng in the Ambālā District of Panjab and the copper finds of the Ganges-Jamna basin are so far unrelated to any cultural period.

The recently excavated site of Brahmagiri (Wheeler, 1947-48) has produced as its first and quite long-lived occupation a stone axe culture which is demonstrably chalcolithic (*ibid.*, fig. 41, 1-5). This culture is overlapped by an iron-using intrusion from the south which displaced it, having regard for the historical probabilities, about 200 B.C. (*ibid.*, pp. 200-202). The 7 to 9 feet of deposited strata of the two phases of stone axe culture, I A and B, at the Brahmagiri town-site cannot carry the start of the occupation back earlier

than c. 1000 B.C. with a limiting margin of 100 years on either side. As archaeological dead reckoning this shows roughly a foot of deposit for each hundred years, which is very low when compared with any other site and can be taken as being on the generous side when estimating the period of settlement of these stone axe people in northern Mysore.

At Māski in the Raichūr District of Hyderabad, 80 miles due north from Brahmagiri, a site has been excavated the pottery of which shows the same succession as has come to light at Brahmagiri. The recording of the finds at this site during the two winter seasons digging, 1935-37, gave no evidence at all of stratification and the results of the excavation of an extensive cemetery in 1943 have yet to be published.¹ The painted pottery that has been illustrated, and all that we recovered from this site, is the russet-coated Āndhra ware ornamented with cream linear patterns, common at Brahmagiri, Chandravalli and other southern Indian sites. In addition there is a great deal of late Āndhra period pottery with incised decoration and of the black and brown polished megalithic ware. Early pottery was represented by poorly fired ware with an unpolished pale brown slip, found below all other types at the town site, also poorly fired and fashioned blotchy pots and better-made grey pots found in the adjacent caves. The indication is of a similar or somewhat shorter occupation than Brahmagiri (Gordon, D.H. and M.E., 1943).

In the newly excavated cemetery extended and contracted burials were found closely overlying burials in terracotta sarcophagi of Perumbair, Madras, type except that they are without feet. These sarcophagi are of two kinds, cylindrical and tub-shaped, and there is a great deal of pottery adjacent to all these burials, large globular pots with covers which appear to be connected with the uncoffined burials and brown and black polished megalithic ware some of which is definitely to be connected with the coffins. The upper burials are less than a foot below the present surface and the terracotta coffins lie at varying depths, the greatest of which would appear to be about 3 to 4 feet below surface.²

Certain points of great interest arise from the finds at these two sites. Firstly that, at the time when the Aśokan inscriptions were cut in the vicinity of both of them, the people who inhabited them were still following a chalcolithic mode of life, and that this state of affairs came to an end only when an intrusive iron-using people from the south settled at these sites bringing with them a distinctive brown and black pottery and megalithic tomb-burial. Secondly, this chalcolithic culture seems to have been poor in copper, but to have produced a profusion of ground and polished stone axes and, at Māski, of flake blades also, though at Brahmagiri these latter are relatively scarce.

The important point from a cultural point of view is that these flakes of chert, agate and chalcedony are not microliths. At Māski this is particularly noticeable. They are of the types attested in chalcolithic cultures of earlier date elsewhere, that is long ribbon-flake blades, the longest that the local chert would produce, similar long blades trimmed to a point and flakes of triangular section with deep lateral scars, all typical in fact of the chalcolithic repertoire of the Indus valley. There are also a few deeply notched blades found at Māski such as have been found at Harappā³, but, save for one lunate at

¹ Reports by Mr. G. Yazdani and Mr. K. M. Ahmad appeared in the *Annual Reports of the Archaeological Department of H.E.H. the Nizam's Dominions*, 1935-36 and 1936-37.

² This information is derived from a set of photographs produced by the Archaeological Department of H.E.H. the Nizam's Dominions and sent to me by Sir Wilfred Grigson.

³ Blades of this type appear also in the Franks collection of microliths from Bundelkhand and Baghelkhand in the British Museum, but are not otherwise known in the microlithic industries of India or Pakistan.

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Brahmagiri, there are no lunates, triangles, trapezes, small crescentic blades or scrapers as is normal in the true microlithic industries of the mesolithic and neolithic. This is borne out too by Bruce Foote's survey of sites in the Bellary, Anantapur and Raichūr Districts ; for he illustrates examples which support my contention that in the chalcolithic period the ribbon-flake technique was employed in preference to small worked artefacts, especially his no. 2663—a parallel-sided flake blade of chert from Wuttugallu (Watgal of the Survey sheets), Raichūr District, which is $3\frac{3}{8}$ inches long (Foote, 1916, pl. 9).

The typology of the stone axes is interesting ; all are of pointed-butt type, the majority have an ovoid or lenticular section, some are ground and polished all over, some are rough-chipped with a ground and polished cutting face, some are not ground at all. It has been suggested by Dr. C. von Furer Haimendorf (Haimendorf, 1948) that the chipped axes with only the cutting edge ground and polished preceded by some time the axes ground and polished all over ; he does not however mention the similar ones which were neither ground nor polished but only chipped but, presuming that these are completed artefacts, logically they should, following this line of reasoning, be earlier still. The excavations at Māski and Kallūr do not bear out this idea.¹ All these types of pointed-butt axe were of contemporary manufacture. They came to light somewhere in the 10 feet of deposit excavated and are associated with the flake blades, found apparently at all levels down to 8 feet below surface, and also with one or more of the styles of the pottery recovered. Personally from my own observations I am inclined to believe that the natural soil at sites D and E at Māski is between 8 and 9 feet below surface, though nothing is recorded by the excavators.

As the site contains the same pottery succession as Brahmagiri and would appear to have been occupied for a shorter period, flakes and axes may have been in use later than at Brahmagiri and c. 800 B.C. is the earliest date that can be suggested for its occupation with any show of reason. The idea of the technical evolution of pointed-butt axes from those chipped all over to those with a ground and polished edge and finally assuming a form which is ground and polished all over, does not get much support from the evidence. It is probable that the first of these were used as hoes or mattocks which did not need a cutting edge, and that the last, which are comparatively scarce in southern Hyderabad, are in some cases imports and in others the adoption of an outside technique which did not find general acceptance. In passing it may be remarked that in the British Isles pointed-butt axes chipped all over with no grinding on the cutting face have been found quite commonly in burials along with other similar axes which are ground and polished either partially or completely.

Dr. Wheeler regards the distribution of stone axes as plotted on the map as indicating a probable movement from the north-east to the south-west (Wheeler, 1947-48, p. 295). In this connection, one point is of particular interest : the only axe that was brought to light in the IA or lower stratum of the stone axe culture at Brahmagiri is a flat square-sided axe of the north-eastern type, deriving via Bihar from Burma and Malaya (Haimendorf, 1948, p. 207). Is its position so early in the sequence of stone axes of any particular significance ? Such axes are extremely uncommon in peninsular India, and Bruce Foote records an axe of this type from the Shevaroy Hills as 'a unique specimen of celt' (Foote, 1916, p. 59, pl. 3, 97) and there is at this stage no real evidence to support any particular theory as north-east from the Krishnā to the Mahānadī the distribution map is void of finds.

¹ Report of Kallūr in the *Annual Reports of the Archaeological Department of H.E.H. the Nizam's Dominions*, 1937-40.

To what extent the gaps on the distribution map are due to lack of searching is difficult to say, but certain areas, as for instance the Peshawar and neighbouring districts, Sind, the West Panjab round Rawalpindi, Campbellpur and Jhelum, Gujarat, parts of the Narmadā basin and the Bombay-Poona area have been well searched for ancient remains and few, if any, pointed-butt axes have been discovered. It is interesting also that in spite of the fact that a large proportion of these axes are made of trap rock, dioritic trap or basalt, none is recorded as coming from the main areas of Deccan trap as shown on the 32 miles to 1 inch geological map of India and Adjacent Countries published by the Geological Survey of India.

At only one site other than Brahmagiri have pointed-butt stone axes been found in stratified excavation and this is at the megalithic site of Burjhāma near the village of Yendarhom, a trifle more than a mile and a quarter north of the famous Shālimār gardens, which are $9\frac{1}{2}$ miles by road from Srinagar, the capital of Kashmir. The site which is on the Yendarhom karewa, is marked by a number of megalithic stones, those still standing forming a rough horseshoe pattern open on the east side, the fallen stones all lying to the west of and close to this horseshoe. The surface produces pottery of many kinds and stone and bone tools. I have visited this site on three occasions and secured specimens of ground stone implements, pottery and a fine bone chisel. I also examined the collection deposited by Dr. De Terra at the Srinagar Museum.

In 1935 Dr. De Terra dug at this site on a somewhat limited scale which however showed the cultural succession quite clearly ; I cannot however say that I agree with his interpretation. The results which are shown in a schematic section (fig. 4) are taken from De Terra's own account of the excavation given in *Studies on the Ice Age in India* and in greater detail in his paper in the *Miscellanea of the American Philosophical Society*, 1936. Briefly, the excavation showed a layer of dark soil with coarse red pottery from surface to 2 feet below surface, a layer of pebbly soil containing ancient rubbish and boulders from 2 to 5 feet and a layer of clay soil with charcoal, pieces of brick, bones, pottery and stone and bone implements from 5 feet to 11 feet 8 inches, at which depth digging was stopped without reaching the natural kerawa silt.

Datable material was provided by pottery ornamented with stamp-designs which came to light in a distinguishable sub-phase from 2 feet to 3 feet in the pebbly layer, of a type commonly found at Buddhist sites which may date from early first century A.D. onward. In the lower portion of this layer there was a fragment of pottery with a greenish polished slip and surface finds of this ware indicate that it was made on a fast wheel and includes a style of carinated dish with slightly incurved sides such as is found at many sites where this particular form appears to have been in use throughout the second century B.C. At some point in this 3 to 5 feet layer highly polished black pottery, almost certainly 'northern black polished ware', appeared, which can be dated fourth to second century B.C.¹ The common pottery of the deep clay layer below 5 feet is a dark buff-coloured hand-made ware, sometimes fired to a muddy pink, with a streaky slip which was smeared on with a rough-ended flat piece of wood. Pottery of this type was also found in the lower part of the pebbly layer along with a greenstone fragment and a pounding stone lying between the boulders and therefore possibly in their true context and not derived from the clay layer below. Some of this coarse pottery has a pink slip with a slight polish impressed with a mat pattern having a narrow diagonal weave, and bases found

¹ De Terra associates this highly polished black ware with the Indus valley. The some half dozen fragments of grey pottery with a highly polished black slip in the Mohenjo-daro Museum are themselves northern black polished ware of early historic date ; nor does any of the Burjhāma pottery in the least resemble Jhāngar ware.

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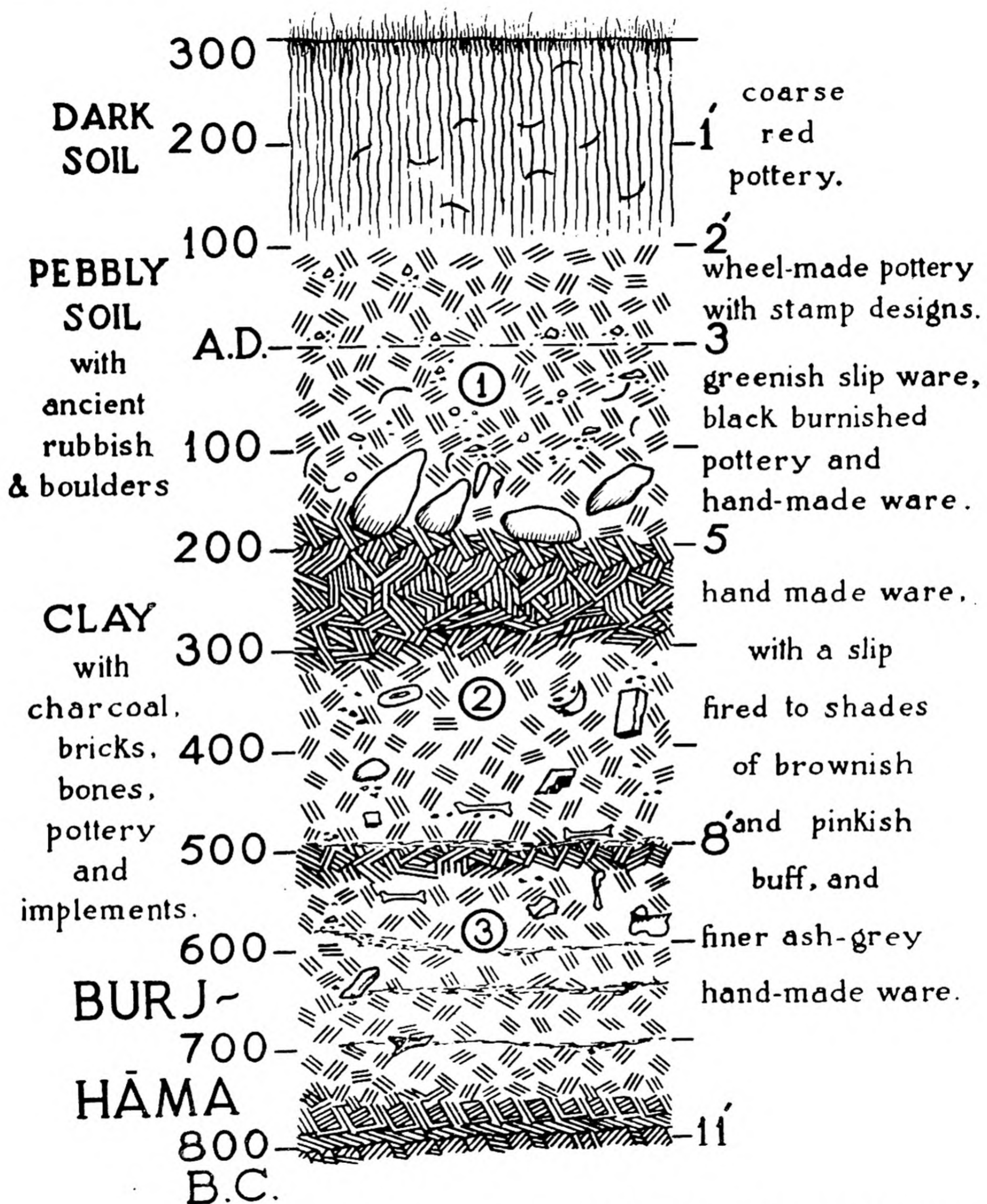


FIG. 4. Schematic section of deposits at Burjhāma, Kashmir, with dead-reckoning dates on 1 foot to 100 years. 1, pounding stone and fragment of greenstone polished axe; 2, perforated greenstone disk; 3, ancient hearths and charcoal

show the broad square weave of the mat upon which they were stood. In addition there are fragments of a finer ash-grey pottery.

Dr. De Terra calls the top of the clay 'an old land surface' and attributes the accumulation of this layer to wind-borne loess; elsewhere however he calls it 'this kitchen midden'. This layer with its contained jumble of charcoal, brick, bones, pottery and implements denotes the normal accumulation of occupation-refuse of an inhabited locality. The long period of time suggested by the slow geological accumulation of wind-borne loess can be discounted. In this connection Dr. T. T. Paterson, concerning his excavations at Nūnar in the Sind, $7\frac{1}{2}$ miles north-west of Burjhāma, writes in a private letter which he has kindly permitted me to quote:—'I myself excavated at Nūnar in the Sind Valley not many miles away, where I demonstrated thumb-marked pottery with stone axes at least 13 feet below the surface. This depth is not indicative of great age, for the soil throughout the excavation showed re-disposition by a late system of irrigation-channels'.

The cultural pattern of Burjhāma is similar to that of Māski and Brahmagiri and shows a stone axe culture starting perhaps as early as 1200 B.C., as natural soil was not reached, and ending some time in the late third or early second century B.C., followed by pottery of the second century B.C., until when Kashmir had probably been a complete cultural backwater, and by occupations of the Buddhist period which may have come to an end about A.D. 300, by which time there were flourishing Buddhist communities at Harwan and Parihāsapura. Nothing has yet been done to discover at which particular period of the existence of this site as an inhabited locality the megalithic stones were erected.

These megaliths and stone axes appear to be extremely isolated, the only pointed-butt axe found in western Pakistan coming from a site on the banks of the Indus opposite Shādipur 21 miles south-west of Attock, and the only megalithic monument within some hundreds of miles being the stone circle at Asota, Swābi Tahsil, North West Frontier Province, which has so far not been excavated. Dr. Wheeler quotes Cunningham as affirming vaguely that cromlechs, cairns and stone circles have been found in the hilly parts of the Districts of Delhi, Mirzāpur and in Orissa (Wheeler, 1947-48, p. 302).

It is obvious that these monuments have no relationship with the megaliths of the south and there are no other megaliths in Pakistan or the countries on its western frontier to which they can be related either. In Bihar and Assam however from which direction the pointed-butt axes probably came, large stones set up as memorials or used as capstones for graves, of a weight and size far exceeding those used in the south, are quite common, and from Bihar the northern branch of this culture seems to have followed the course of the Jamna along the high ground to the south and west through Mirzāpur, Rewa and Bāndā onward to the sites mentioned by Cunningham near Delhi and the megalithic tomb reported by Carlleyle at Deosā, 32 miles east of Jaipur. Beyond this point there is a gap.

De Terra on the map in his fig. 180 (De Terra and Paterson, 1939) indicates a number of neolithic sites of which one west of Nūnar in Kashmir and one west of Jhelum City cannot be traced in any publication. The sites of Mandori near Attock and of Ghariāla west of Campbellpur are inserted presumably on the supposition that the rock-engravings and bruising found there must be neolithic. It is unlikely that any of the rock-engravings found in India and Pakistan are neolithic any more than the rock-paintings. The two Kharoshthi inscriptions at Mandori are produced in the same manner and have the same degree of patina as the rest of the engravings. Metal axes, swords, shields and horse-riding can be observed at most of the sites where these engravings appear and it is most unlikely that the majority, if indeed any of them, date to a period when metal was unknown (Gordon, D.H. and M.E., 1941, and Gordon, A and B, 1945).

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To what extent can stone industries be related to the advent of metals? True microliths can be associated with the peasant-cultures of the Zhob which produced wheel-turned painted pottery. With the appearance of the urban Harappā culture a less imaginative stone technique was employed to turn out ribbon-flake blades in large quantities. This method of stone working seems to have persisted at a much later date at Māski and Brahmagiri. The copper axes of West Bengal and Bihar seem to have copied the Eastern shouldered stone axes introduced from the Burmo-Indonesian area, and therefore date from a period when these axes were still in general use.¹

It is also worthy of note that in two localities flakes of microlithic or chalcolithic type are to be found in direct or closely neighbouring association with metal-working sites. This occurs in the Raichūr District of Hyderabad, about which Mr. K. M. Ahmad says: 'As a rule, wherever signs of early smelting were found, they were accompanied by a discovery of microliths if not by neolithic axes' (*Annual Reports*, 1935-36, p. 29). Chert flakes were found also on the surface of ash-mounds having some relation to iron-smelting both at Yergunty and Gaudur. In southern Bihar the majority of the microlithic sites are associated with the copper belt which starts 5 miles north of Chakradharpur and runs through Kharsāwān and Seraikelā and across Dhalbhūm through Rākhā Mines to Ghātsilā on the Subarnarekhā. I have visited various microlithic sites and ancient workings with Mr. E. F. O. Murray who has made an excellent survey of this area. Copper slag heaps and microliths are in close proximity, and the presence of microlithic sites from Chakradharpur to Ghātsilā, including Tālsā, Banabassa and Rākhā Mines, coincides so closely with the copper seam that it is difficult to suppose they were not associated. Murray illustrates four axes all of pointed-butt type which, from their findspots at Tālsā and Chandar Buru on the copper seam, are probably part of a chalcolithic culture similar to that of Māski and Brahmagiri (Murray, 1940, pls. 10 and 11, fig. 1).

Though by no means conclusive as indicating some connection between microliths and copper-working, it is interesting to note that exploration in Mayūrbhanj in northern Orissa, though producing palaeoliths and ground and polished stone axes, has brought to light no microlithic sites. Pointed-butt axes, one being of the eastern straight-sided type, were found by Mr. N. K. Bose in the thin clay cap which in places overlies the laterite bed (Bose, 1940), and Mr. P. Acharya, the State archaeologist, has found yet others including some of shouldered type. Bose and his party searched an area of ten square miles in the vicinity of Kuliānā where excavations were made, but neither they nor Mr. Acharya seems to have encountered any microliths; nor did I see any in the collection in the small museum at Khiching in Mayūrbhanj, nor find any during my explorations in Kolhan between Bahalda and Khiching; in fact once away from the copper seam no microliths are to be found.

At the site of Patpād in Baganpalle (now in Madras State) which is enclosed by the Kurnool District, Bruce Foote found what he termed a 'cache' and also a neighbouring habitation-site. In the cache were pots of red and black 'megalithic' ware and in these pots were four barbed and tanged arrow-heads of iron and a number of chert cores.² On the habitation-site were found worked and unworked flakes, also scrapers and cores of chert, chalcedony, agate and Lydian stone. The pottery is not well described but polished

¹ The alternative is that these shouldered axes, or more correctly perhaps tanged adzes, are copies of metal types.

² It is of course possible that these cores were collected and prized by the iron-using people as lucky objects in the same way as neolithic polished stone celts of small size have been collected as amulets. The evidence of Māski would however appear to be against this and to indicate that long flake blades continued contemporary with the use of iron.

black ware and unpolished red ware are mentioned. An open spouted pot of red polished ware was also brought to light, having narrow purplish lines below the outer edge of the rim near the spout (Foote, 1916, pls. 26, 49 and 55, pp. 113f). This can be compared with the spouted jugs of red ware from the stone circle burials of the Perumal Hills, Kōḍaikanāl, and with similar spouted pots, P16, fig. 14 and more especially T44, fig. 21, from Brahmagiri (Wheeler, 1947-48, p. 222). At Tsanagundla Drug, Pattikondā, Kurnool District, Bruce Foote unearthed a carinated pot of brown ware with incised wavy line decoration and with it flakes and cores of agate, chert and chalcedony. The decoration, shape, everted rim and fabric suggest that this pot and its accompanying flakes and cores are of the period of the chalcolithic stone axe culture (Foote, 1916, pl. 57, pp. 117-18).

The Patpāḍ site seems to present features of the overlap of the flake blade using stone axe culture and the iron-using megalithic culture as found at Brahmagiri and Māski. Bruce Foote considered that the settlement at Face Hill, Bellary, whose people used the profusion of ground and polished axes, smelted iron; the slag and pottery nozzles for furnace-bellows testifying to a smelting industry at this spot. All the above instances taken together go to show quite clearly that the use of stone in the form of microliths, ribbon-flake blades and various types of pointed-butt axes, persisted for a long time after the use of metal was introduced.

CONCLUSIONS

Though much confirmatory detail is yet required, the outlines of the pattern of culture of the recent stone industries of India and Pakistan are clear. In the same manner as can be observed in Europe, North Africa and Palestine, microlithic cultures in India succeed a blade-using upper palaeolithic culture. The duration of the use of microliths is considerable but far from incredible when one recalls the immensely long palaeolithic periods. In these same areas microliths, having been the type-tool of the mesolithic, continued with the introduction of pottery and agriculture into the neolithic and, where ground and polished stone axes were absent, remained the type-tool along with bone implements and the earliest traces of copper.

In those regions which were affected by the culture of the early city-dwellers, microliths lose their diversity of form and are superseded by the ribbon-flake, mass produced, utility blade. This style of blade which appears at many sites in the Middle East is to be found on all Harappā culture sites along with the copper flat axe, and also at a much later date at Māski and Brahmagiri where it is accompanied by the pointed-butt ground and polished stone axe in a chalcolithic, and at Māski possibly an iron-using, setting. In more remote jungle areas however true microliths continued to be used down to early historic times. As early as 1924 Cammiade wrote: 'I venture to express the view that the pygmy culture as represented in the Godāvarī had a very long duration commencing in the early neolithic period and extending down to comparatively recent times' (Cammiade, 1924, p. 102). All subsequent researches have proved this to be correct.

India and Pakistan seem to have followed the pattern of the Near East. C. C. McCown says: 'Polished stone tools are found in Palestine in relatively small numbers and always in connection with copper or bronze. It appears that somewhere in the Near East, or not far from it, the use of copper and then of bronze was discovered before the use of polished stone tools became wide spread or perhaps known at all' (McCown, 1943, p. 52). It is therefore quite reasonable to suppose that the arrival of the pointed-butt ground and polished stone axe from the north-east came much later than that of the copper flat axe from the west.

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The reason that govern the world-wide succession of stone techniques, the general uniform progress made in the manufacture of blade and core tools, the introduction of microliths and bone tools at a certain stage,—whether in fact this almost uniform progress should be attributed to diffusion alone or whether some more inherent or pervasive influence was at work,—remain as yet undetermined. There is no evidence at all of the diffusion of the mesolithic-microlithic culture either to or from India or Pakistan, nothing of this type having yet come to light within many hundreds of miles of their borders.

Dr. C. von Fürer Haimendorf has pointed out : ‘ the ways of life and the economic pattern of both the older and younger stone ages still persist in aboriginal India ’ (Haimendorf, 1948, p. 208), that is the jungle-dweller now performs with metal tools the same tasks that he performed with stone ones, and it is possible that by doing so he has made the one step by which he shares to that extent the handicap of civilized man in using something which he is unable to make for himself.

It would seem that a greater part of peninsular India was in a microlith-using mesolithic or neolithic stage of culture from relatively remote times and continued in this manner of living while chalcolithic urban or semi-urban cultures spread over the great river-valleys of the north. We have proof of a chalcolithic culture reaching Brahmagiri, bringing with it ground and polished axes. We know that this culture persisted in this area until it was displaced by an iron-using people from the south. Of the use of iron in the north in ancient times we have no knowledge except what can be derived from literary sources. The only known sites which may help to throw some light on the spread of chalcolithic culture from the north are those reported by Mr. A. V. Pandya at Chikalda and Maheshwar, which command what are probably age-old crossings of the Narmadā, but apart from the fact that they appear to combine microliths with pottery and a town-site, there is little real information available.

I have tried to make this survey as complete as possible and trust that it fulfils its object of attempting to bring the hitherto rather unco-ordinated finds spread over the sub-continent into some sort of law and order. Some who do not appear to know a great deal about ancient India themselves say that very little if anything is known about it by anyone else, and that very little if anything is being or has been done to alter this state of affairs (e.g. William Howells in *Man so far*, p. 245, 1947). Actually many people have done a great deal and it is their work that has made this paper possible. Others are doing and will do more, and what is now the outline of a perfectly recognizable pattern will gain considerably both in definition and authority.

APPENDIX A

The relative occurrence of microliths and sherds at Hirpurā and Langhnāj

Depth below surface	Hirpurā Pit I		Langhnāj Mound I, Pit I		Langhnāj Mound II, Pit I		Langhnāj Mound II, Pit II	
	<i>Micros</i>	<i>Sherds</i>	<i>Micros</i>	<i>Sherds</i>	<i>Micros</i>	<i>Sherds</i>	<i>Micros</i>	<i>Sherds</i>
S	8	21	39 Sl. 100+Rj.	One (lost)	45 Sl. ? Rj.	7	40 Sl. 50±Rj.	17
1'	50	31	19 Sl. 50+Rj.	6	42 Sl. 50+Rj.	11	26 Sl. 25±Rj.	2
2'	76	3	3 Sl. Few Rj.	1 & 1 tor- so of fig.	44 Sl. 100+Rj.	2	50 Sl. 40±Rj.	5
3'	72	Nil	1	1	93 Sl. 200+Rj.	2	15	Nil
4'	28	Nil	1	1	30	Nil	23 Sl. Few Rj.	Nil
5'	1	Nil	7	1	18	Nil	Nil	Nil
6'	Nil	Nil	9	Nil	5	Nil	..	..
7'	..	..	Nil	Nil	8	Nil	..	..
8'	..	..	..	..	2	Nil	..	..

NOTES : Sl. and Rj. represent 'Selected' and 'Rejected', + and ± equal 'more than' and 'about'. Nothing was found below 9' below surface.

APPENDIX B

A note on Dr. Hunter's work (fig. 5)

The difficulty one experiences in following Dr. Hunter's reports is due to various reasons. The ground was divided as the work proceeded into areas which were of varying sizes both in length, width and depth. It has been found possible to interpret this very complicated method for the general area A to G and 19 feet to 14 feet of Hunter's surface-divisions of foot squares in section only, but it is quite hopeless to attempt a plan of digging areas that vary in dimension at every level. For eleven areas which produced flakes and, save for one, pottery, there is no detailed record. Further, no clear distinction is made in the interim report between the record of finds by levels and the catalogue of finds in which no record of the findspot occurs.

Dr. Hunter recorded his finds of flakes and pottery by the measure of a cylindrical tin of the size that contains 50 cigarettes. Using a mixture of Pachmarhi flakes varying in size from $\frac{1}{4}$ to 2 inch in length and also a mixture of typical pottery fragments, I found that in round numbers one tin equals 210 flakes or 26 pottery-fragments and in the tables approximate numbers on this basis have been given with the tin-measure given by Hunter in brackets.

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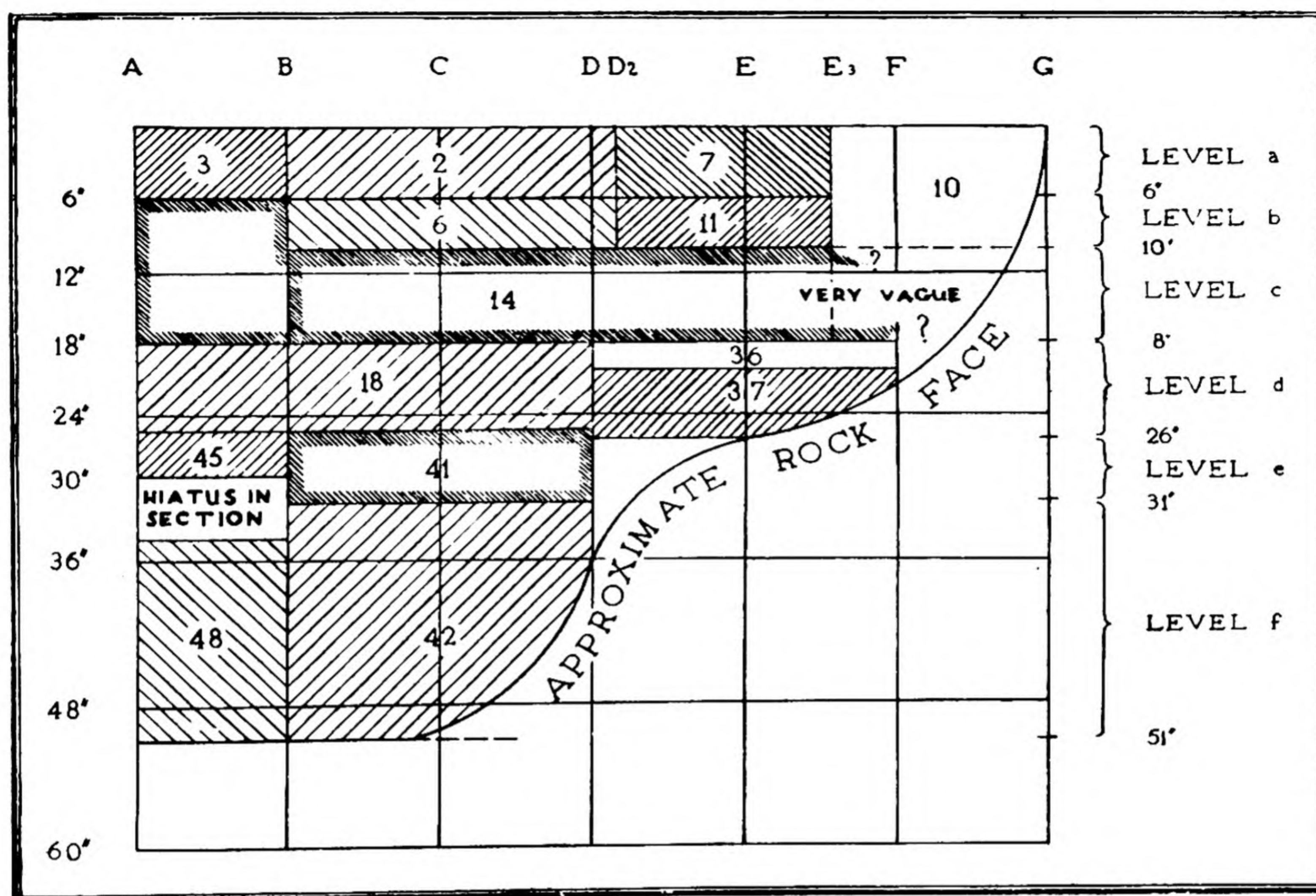


FIG. 5. Schematic section, Dorothy Deep Shelter, of area A to G—19 to 14 feet of Hunter's excavations at Pachmarhi, 1934-35

It is essential that some clear idea of levels as represented by various areas referred to in the report should be arrived at, and a close study of the report has enabled me to fix the following levels:—

- Areas no. 2, 3, 7 and 10 : level (a)
- " " 6, 10, 11 and 14 : level (b)
- " " 10 (?) and 14 : level (c)
- " " 18, 36 and 37 : level (d)
- " " 41 and 45 : level (e)
- " " 48 and 42 : level (f)

The exact sectional dimensions in depth and width of each area and its relative stratigraphical position to other areas was extracted and this is embodied in the schematic section that accompanies this appendix (fig. 5). The finds in each area could then be allotted to their proper level and this enabled the 'Pachmarhi sequence' in the main text of this paper (above, p. 75) to be produced.

APPENDIX C

The work of A. C. Carlleyle

Since completing this paper I encountered a reference to Mr. V. A. Smith's article on 'Pygmy Flints' in the *Indian Antiquary*, XXXV (1906). From this it is even more apparent that a body of extremely important information, the result of diligent investigation on the part of Mr. A. C. Carlleyle chiefly in the years 1880 and 1881, has been lost, as a result of negligence or lack of appreciation.

The *Proceedings of the Asiatic Society of Bengal* for February 1883 mention that a paper by A. C. Carlleyle, 'Notes on lately discovered sepulchral mounds, cairns, caves, cave paintings and stone implements', had been received; it was never published. Neither this paper nor certain other papers on these subjects in the possession of his daughter have ever been brought to light. Vincent Smith however obtained some notes which Carlleyle had sent to the Rev. Reginald Gatty which serve only to stress the value of what has been lost.

Carlleyle's description of the nature of the cave or rock-shelter deposits of Baghelkhand might well have been written of the shelters in the Mahādeo Hills—the resemblance is so close. He says: 'The depth of soil left in such caves and under such rock-shelters varied from a minimum of about six inches to one foot and a half or two feet—up to a maximum of from two feet and a half to three feet; though in some of the deep hollows of the uneven floors it might be even more, or as much as four feet'. This might well be a description of Dorothy Deep Cave, Pachmarhi, excavated by Dr. Hunter, where a trough-like depression gave a maximum depth of 51 inch deposit on a floor which otherwise showed a deposit ranging from 4 to 18 inches.

In caves where there was any depth of a deposit Carlleyle states that in the lowest stratum, 'The implements were always found to be of an older and more archaic type than the rest', but he gives no details, presumably they are the ones that he stated on the authority of J. A. Brown to be larger flake implements. At a medium depth in these deposits he tells us he frequently found 'undisturbed layers of embers and charcoal' and also, associated with the microliths, pieces of haematite 'rubbed down on one or more facets', such haematite pencils being far from rare in the Pachmarhi shelters.

His description of the rock-paintings is strikingly familiar. He says: 'There were rock-paintings, apparently of various ages. . . . Some of these rude paintings appeared to illustrate in a very stiff and archaic manner scenes in the life of the ancient stone chippers; others represent animals or hunts of animals by men with bows and arrows, spears and hatchets'. I should be most surprised if these weapons did not all reveal metal types. He found no ground or polished implements nor ring-stones, but a certain number of 'fragments of very rude pottery' and in one case a cave 'entirely filled with pottery and ashes and nothing else'.

He found vast quantities of implements, flakes and cores. From only two caves and two shelters he recovered about four thousand, of which 1,200 were lunates, 500 of these being from a single cave. Carlleyle also excavated a number of grave mounds, in what he describes as the valleys of the Vindhya Range. In these he found whole skeletons, rude earthenware vessels and fragments of pottery with small stone implements and numerous flakes of the forms and types found in the caves. He was unable to recover a skeleton as all were extremely friable, and it is doubtful whether at that period he had either the knowledge or the equipment to lift a skeleton in this condition. He does not particularize about the burials whether they were extended or contracted, laid on one side or the back. One point is however quite clear: the burials contained as a grave-group a body accompanied by microliths and pottery, but no metal.

The exact position of the caves, shelters and mounds discovered and excavated by Carlleyle is not known, but it would appear that they must all lie in the 180 mile stretch of the northern slopes of the Kaimūr Range from Ajaigarh on the west to Robertsganj on the east, and that most of them are between the rivers Tons and Son. What is surprising is the fact that since 1881 no one has made any attempt to trace these sites.

Cockburn who investigated shelters in the Kaimūr Range states that these, where there is any earth on the floor, 'form veritable museums of prehistoric antiquities in the way of flint knives, cores, arrowheads; celts, fragments of fossil and charred bones, pottery, etc.' According to Mr. J. H. Rivett-Carnac in his article on Stone Implements from the North West Provinces of India in the *Journal of the Asiatic Society of Bengal*, LII (1883), Mr. Cockburn had undertaken to figure and describe at length the very large, varied and most interesting collection of implements of chert; this was never done. Rivett-Carnac's own paper is of very little value as practically all the implements he figures came from collections of stones deposited at Shrines. They are for the most part pointed-butt stone axes and grooved hammer-stones and he and Cockburn collected more than 400 of the former, which, like the Hyderabad specimens, ranged in size from a huge specimen 12½ inches long to quite tiny ones. Not one of these axes appears to have come from any cave or rock-shelter.

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BIBLIOGRAPHY

1. *Annual Reports of the Archaeological Department of H.E.H. the Nizam's Dominions*, 1935-36 and 1936-37, Māski and 1937-40, Kallūr.
2. Aiyappan, A. (1945). 'The Megalithic Culture of Southern India', *Journal of the Indian Anthr. Inst.*, I (New Series).
3. Bose, N. K. (1940). 'Prehistoric Researches in Mayurbhanj', *Science and Culture*, no. 2.
4. Brown, J. A. (1889). 'On some highly specialized forms of Stone Implements found in Asia, North Africa and Europe', *Journal of Royal Anthr. Inst.*, XVIII.
5. Cammiade, L. A. and Burkitt M., C. (1930). 'Fresh Light on the Stone Ages of South-east India', *Antiquity*, IV, Sept.
6. Cammiade, L. A. (1924). 'Pygmy Implements of the Lower Godāvari', *Man in India*, IV.
7. Clark, J. G. D. (1932). *The Mesolithic Age in Britain*, Cambridge.
8. Codrington, K. de B. (1930). 'Indian Cairn and Urn Burials', *Man*, 139, Oct.
9. De Terra, H. and Paterson, T. T. (1939). *Studies on the Ice Age in India and Associated Human Cultures*, Washington, D.C.
10. De Terra, H. (1936). 'Excavations at Burjhama', *Miscellanea of the American Philosophical Society*.
11. Foote, R. B. (1916). *The Foote Collection of Indian Prehistoric and Proto-historic Antiquities ; Notes on their Ages and Distribution*, Madras.
12. Fürer Haimendorf, C. von., (1948). 'Notes on the Stone Age in India', *Man in India*, XXVIII, no. 4.
13. Garrod, D. A. E. (1932). 'A New Mesolithic Industry : the Natufian of Palestine', *Journal of Royal Anthr. Inst.*, LXII.
14. Ghosh, M. (1932). *Rock-paintings and other Antiquities of Prehistoric and Later Times*, Memoirs of the Archaeological Survey of India, no. 24.
15. Gordon, D. H. and M. E. (1940). 'Mohenjo-daro : some observations on Indian Pre-history', *Iraq*, VII, pt. 1.
16. Gordon, D. H. and M.E. (1941). 'The Rock Engravings of the Middle Indus', *Journal of Royal Asiatic Society of Bengal*, VII.
17. Gordon, D. H. and M. E. (1943). 'The Cultures of Māski and Madhavpur', *Journal of Royal Asiatic Society of Bengal*, IX.
18. Gordon, D. H. (1936). 'The Rock Paintings of the Mahādeo Hills', *Indian Art and Letters*, X, no. 1.
19. Gordon, D. H. (1938). A. 'Microlithic Industries of India', *Man*, 19, Feb.
20. Gordon, D. H. (1938), B. 'More microlithic sites in India', *Man*, 62, April.
21. Gordon, D. H. (1940). Series of Articles on Rock Paintings of the Mahādeo Hills and Raigarh in Pts. 3, 5, 6, 7, 10 and 11, *Science and Culture*, V, Calcutta.
22. Gordon, D. H. (1945), A & B. 'A survey of Ancient Gandhara and Archaeological Miscellany' (a record chiefly of microlithic sites and rock-engravings), *Journal of the Indian Anthr. Inst.*, I, (New Series).
23. Hunter, G. R. (1935-36). 'Interim and Final Reports on the Excavation in the Mahādeo Hills', *Nagpur University Journal*, nos. 1 and 2.
24. King, C. (1940). 'Rock Drawings on the Indus', *Man*, 83, May.
25. Krishnaswami, V. D. (1947). 'Stone Age India', *Ancient India*, no. 3.
26. Mackay, E. (1943). *Chanhudaro Excavations 1935-36*, New Haven, Connecticut.
27. Majumdar, N. G. (1934). *Explorations in Sind*, Memoirs of the Archaeological Survey of India, no. 48.
28. Marshall, J. and others, (1931). *Mohenjo-daro and the Indus Civilization*, London.
29. McCown, C. C. (1943). *The Ladder of Progress in Palestine*, 3rd ed., New York.
30. Murray, E. F. O. (1940). 'The Ancient Workers of Western Dhalbhum', *Journal of Royal Asiatic Society of Bengal*, VI.
31. Osten, H. H. von der (1937). *The Alishar Hüyük*, I & II, Chicago.
32. Rangacharya, V. (1929). *Pre-Muslman India*, I, Pre-historic India, Madras.

33. Reid Moir, J. (1935). 'The Problem of Palaeolithic Pottery', *Man*, 89, June.
34. Sankalia, H. D. and Karve, I. (1944). 'The Second Gujarat Prehistoric Expedition', *New Indian Antiquary*, VII, no. 1.
35. Sankalia, H. D. (1946). *Investigations in Prehistoric Archaeology of Gujarat*, Baroda.
36. Smith, V. A. (1906). 'Pygmy flints', *Indian Antiquary*, XXXV.
37. Todd, K. R. U. (1932). 'Prehistoric Man round Bombay', *Proc. of the Prehistoric Society*, VII.
38. Todd, K. R. U. (1939). 'Palaeolithic Industries of Bombay', *Journal of the Royal Anthropological Institute*, LXIX.
39. Todd, K. R. U. (1948). 'A Microlithic Industry of Eastern Mysore', *Man*, 27, March.
40. Turville-Petre, F. (1932). 'Excavations at Mugharet-el-Kebarah', *Journal of the Royal Anthropological Institute*, LXII.
41. Wheeler, R. E. M. (1947-48). 'Brahmagiri and Chandravalli 1947', *Ancient India*, no. 4.
42. Wulsin, F. R. (1941). *The Prehistoric Archaeology of North West Africa*, Cambridge, Mass.

POSTSCRIPT

The following modifications and additions are found necessary as the result of additional information. The statement on p. 77 that no stone axes have been found in Sind or the Indo-Iranian borderland is incorrect. Part of a ground and polished stone axe was found by G. S. Ghurye at Orangi close to Karachi and two axes of this type were found by H. Hargreaves at Nāl. Three ground and polished axes were also found at Sirkap, Taxila, where they were without doubt kept as curios or luck-bringers. On the same page, the flake mentioned of triangular section with deep lateral scars seems to be not an artefact but a technical by-product.

The points made about chipped and ground and polished axes on p. 79 are amply borne out by the material recovered from the workshop sites at Sanganakallu (B. Subba Rao, *Stone Age Cultures of Bellary*, Poona, 1948) and near Barda (D. Sen, 'A Celt-site in Singhbhum', *Man in India*, 30, no. 1, 1950), the chipping, grinding and polishing being shown to be stages in manufacture.

REPAIRS AT AGRA AND FATEHPUR SIKRĪ : 1944-49

By MADHO SARUP VATS

In this short review the Joint Director General of Archaeology in India, besides incidentally touching on the history and main features of some of the Mughul buildings at Agra and Fatehpur Sikrī, describes the protected and intricate operations carried out by him for their preservation while he was the Superintendent in charge of these buildings. It is hoped that other officers confronted with similar problems will benefit by his experience.

THE TĀJ

THE Tāj, which deservedly ranks amongst the finest tombs of the world, stands on the right bank of the Jamnā, about a mile below Agra Fort. It contains the remains of the Emperor Shāh Jahān (1627-58) and of his favourite wife, Arjumand Bānū Begam, better known as Mumtāzu-z-Zamānī or Mumtāz Mahal. She was the daughter of Abu'l-Hasan, entitled Āṣaf Khān Āṣaf Jāhī, son of I'timādu'd-Daula Mīrzā Ghayāth, and niece of the illustrious Nūr Jahān, wife of Emperor Jahāngīr (1605-27). In her twentieth year she was married to Prince Khurram, afterwards Emperor Shāh Jahān, on Friday the 9th of Rabī' I, 1021 A.H. (10th May, A.D. 1612) and died on the 7th Zīqa'da, 1040 A.H. (28th June, A.D. 1631) after giving birth to her fourteenth child, Princess Gauhar Arā, at Burhānpūr in Khāndes whither she had accompanied her husband on his expedition against Khān Jahān Lodī, the rebellious Governor of the Deccan. Her body was temporarily interred in the garden of Zainābād at Burhānpūr, whence, under the orders of Shāh Jahān, it was brought to Agra after six months on the 17th Jamādī I, 1041 A.H. (11th December, A.D. 1631) by Prince Shujā', Wazīr Khān and Satiu'n-Nisā Khānam, sister of the poet-laureate Mīrzā Tālib Amī.

In the meantime a suitable site was selected, which, being the garden of Rāja Jai Singh of Jaipur, was duly exchanged for an equally valuable state land, and her remains were again temporarily deposited near the present *bāolī* in a domed structure on the 15th Jamādī II, 1041 A.H. (8th January, A.D. 1632) until their permanent burial in the mortuary chamber of the Tāj. The emperor himself died on Monday the 26th of Rajab, 1076 A.H. (1st February, A.D. 1666) and was buried in the same chamber to the west of Mumtāz Mahal's grave.

The question as to who designed the Tāj is disputed, but there is epigraphical evidence to show that it was Ustā Aḥmad of Lahore.¹ The mausoleum was constructed

¹ The *Wathnawī* of Latḥfullāh Muhandis, second son of Ustā Aḥmad of Lahore, which, according to a chronogram in it, was completed in the year 1066 A.H. (A.D. 1655-56 i.e. during the reign of Shāh Jahān) pointedly states that Ustā Aḥmad was responsible for the construction of the Tāj, the Delhi Fort and the Jāmi' Masjid at Delhi besides other imperial buildings.

Ustā Aḥmad's eldest son, 'Atāu'llāh Rashīdī, in his work entitled *Khulāṣatu'l-Hisāb*, also written during the reign of Shāh Jahān, mentions his father as *Mi'mār-i-Kul* (Chief Architect) of Shāh Jahān.

His third son, Nūru'llāh, was responsible for the inscriptions in the Jāmi' Masjid at Delhi. These facts indicate that Ustā Aḥmad and all his sons had been working at the royal buildings.

Again, Luṭfu'llāh, in the epigraph engraved by him on his father's tombstone at Aurangābād, confirms that Ustā Aḥmad was the builder of the Tāj, Delhi Fort and the Jāmi' Masjid at Delhi. The cumulative effect of the above evidence is that Ustā Aḥmad of Lahore was probably the designer of the Tāj as stated above; see also the Annual Number of the *Kārwān* for 1934 (Lahore) compiled by Majīd Malik, pp. 125-34.

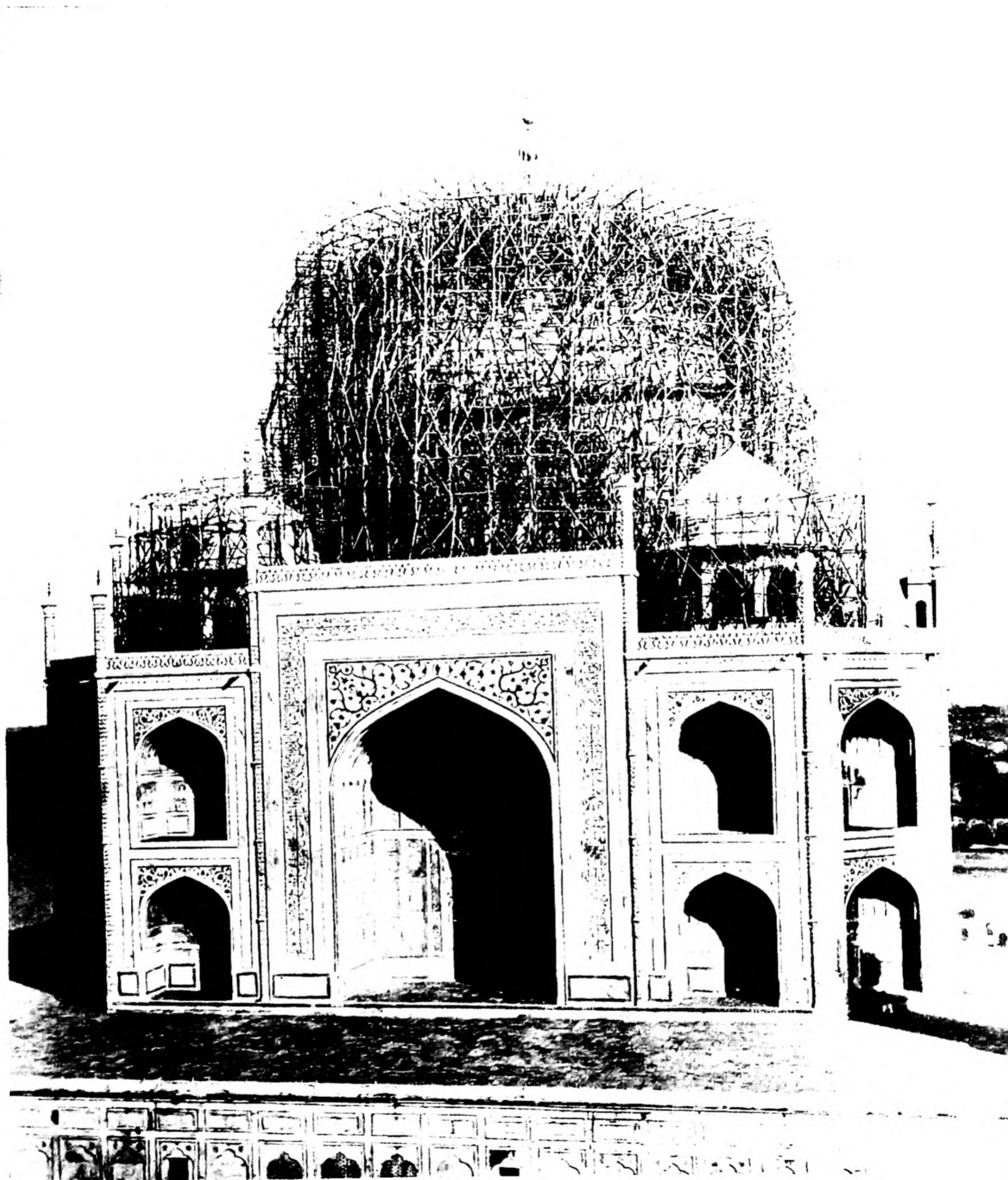
under the superintendence of Makramat Khān and Mīr 'Abdu'l-Karīm, the dome being built by Ismā'il Khān of Turkey and the inscriptions executed by 'Abdu'l-Haq, better known as Amānat Khān of Shīrāz, who was brother of Shāh Jahān's minister, Afzal Khān, and was the best calligraphist of his age. The tomb was begun in 1041 A.H. (A.D. 1631) and completed in 1057 A.H. (A.D. 1648) with the mosque on the west, the *Jawāb* or Mihmānkhāna on the east and the main gateway on the south, the outer court and its cloisters being added subsequently and completed in 1653. The white marble so plentifully used came from Makrāna and Rāiwāla in Jaipur State, the red sandstone from Fatehpur Sikrī and the neighbourhood of Agra, and the jewels and precious stones from Persia and elsewhere. Mullā 'Abdu'l-Hamīd Lahorī, who was instructed by Shāh Jahān to write a detailed history of the Tāj, further informs us in the *Bādshāhnāma* that the foundation was laid in the sub-soil water-level, that the masonry below the ground was stone in lime, and that the platform above ground was of brick in mortar faced with marble veneer. Owing to the proximity of the river the whole fabric together with the four corner *mīnārs* was made to rest on a firm bed of masonry which seems to have been supported on piers sunk at close intervals in accordance with the usual Mughul practice. The exact cost of building the Tāj with its complementary buildings is not known. The recorded expenditure of 50 lakhs of rupees is rightly construed to mean that the amount was expended on miscellaneous petty charges and the wages of 20,000 workmen, etc., who worked at the Tāj for so many years, but not on the acquisition of marble and semi-precious stones used for inlay.

The history of its repairs is no less interesting. The earliest record of its repairs is available in a letter,¹ dated (A.D. 1652), from Prince Aurangzeb to his imperial father, Shāh Jahān, wherein he points out defects in the dome and vaults of the mausoleum, saying 'the dome of the holy tomb leaked at two places towards the north during the rainy season and so also the fair semi-domed arches, many of the galleries on the second storey, the four smaller domes, the four northern compartments and the seven arched underground chambers, which have developed cracks. During the rains last year the terrace over the main dome also leaked in two or three places. It has been repaired, but it remains to be seen during the ensuing rainy season how far the operations have proved successful. The domes of the mosque and the Jamā'at Khāna leaked during the rains and were made water-tight. The master builders are of the opinion that if the roof of the second storey is re-opened and dismantled and treated afresh with concrete over which half a yard² of mortar grout is laid, the semi-domed arches, the galleries and the smaller domes will probably become water-tight, but they say that they are unable to suggest any measures of repairs to the main dome.....' History is, however, silent about the actual steps taken by the Emperor on the prince's letter in respect of repairs to the dome.

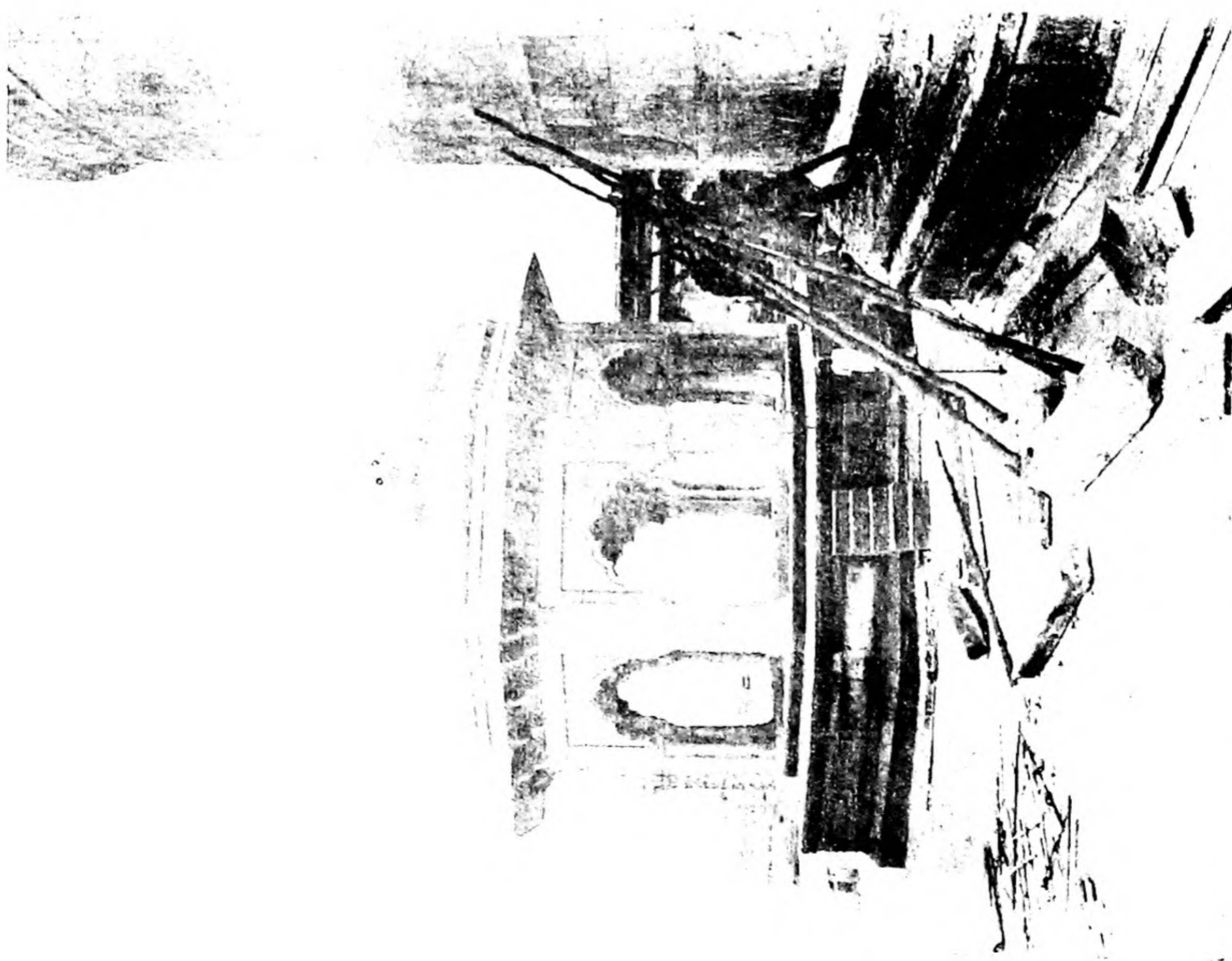
From subsequent records it is gathered that under the British rule Captain Taylor was appointed in 1810 to execute repairs to the Tāj under the guidance of Col. Hyde, the then acting Chief Engineer, and the entire outer surface of the Tāj was repaired and cleaned, the missing stones replaced, and the mosaic-work completely renewed. But

¹ The original letter is published in the *Muraqqa'ī-Akbarābād*, ed. by Sa'id Ahmad (Agra, 1931), p. 43, note 2.

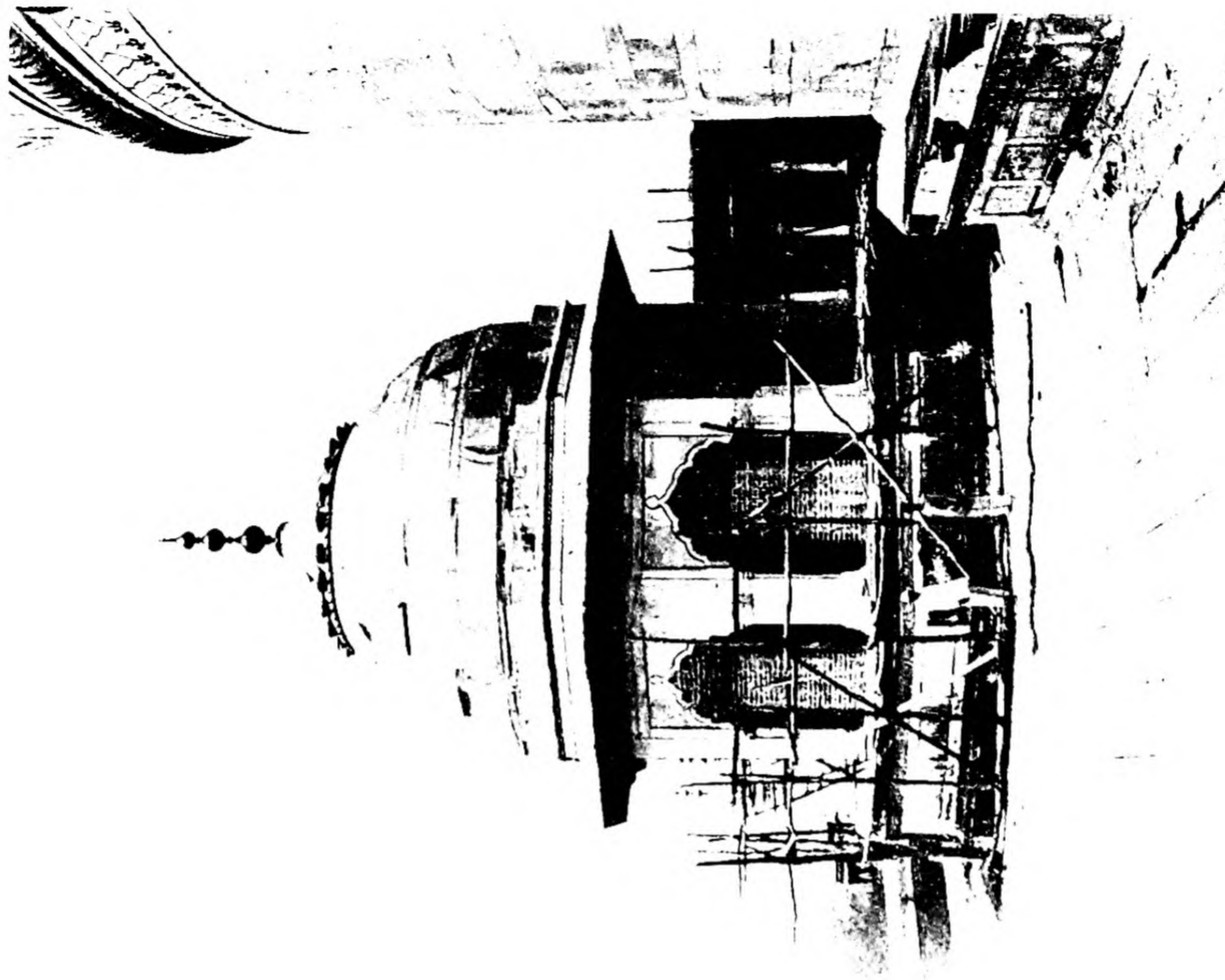
² Abu'l-Fazl, in his *Ain-i-Akbarī* (Royal Asiatic Society of Bengal, 1872, II, Bk. iii, pp. 294-6), mentions the names of various 'yards' used in the reigns of Sikandar Shāh Lodī, Humāyūn and Akbar and gives their exact lengths, which ranged from 41 to 46 fingers. According to the *Bādshāhnāma* (Roy. As. Soc. Bengal, 1867, Persian text, I, part ii, p. 237), the Zara' (or yard) of Shāh Jahān measured 40 fingers or digits, one digit being equal to 4 inches; see also Webster's *English Dictionary*, p. 623. Thus Shāh Jahān's Zara' was equal to 2 feet 6 inches.



Agra. The Tāj Showing scaffolding round the main dome and the chhatris



A. The Tāj showing the berm of the main dome under repairs and the south-east chhatrī after conservation

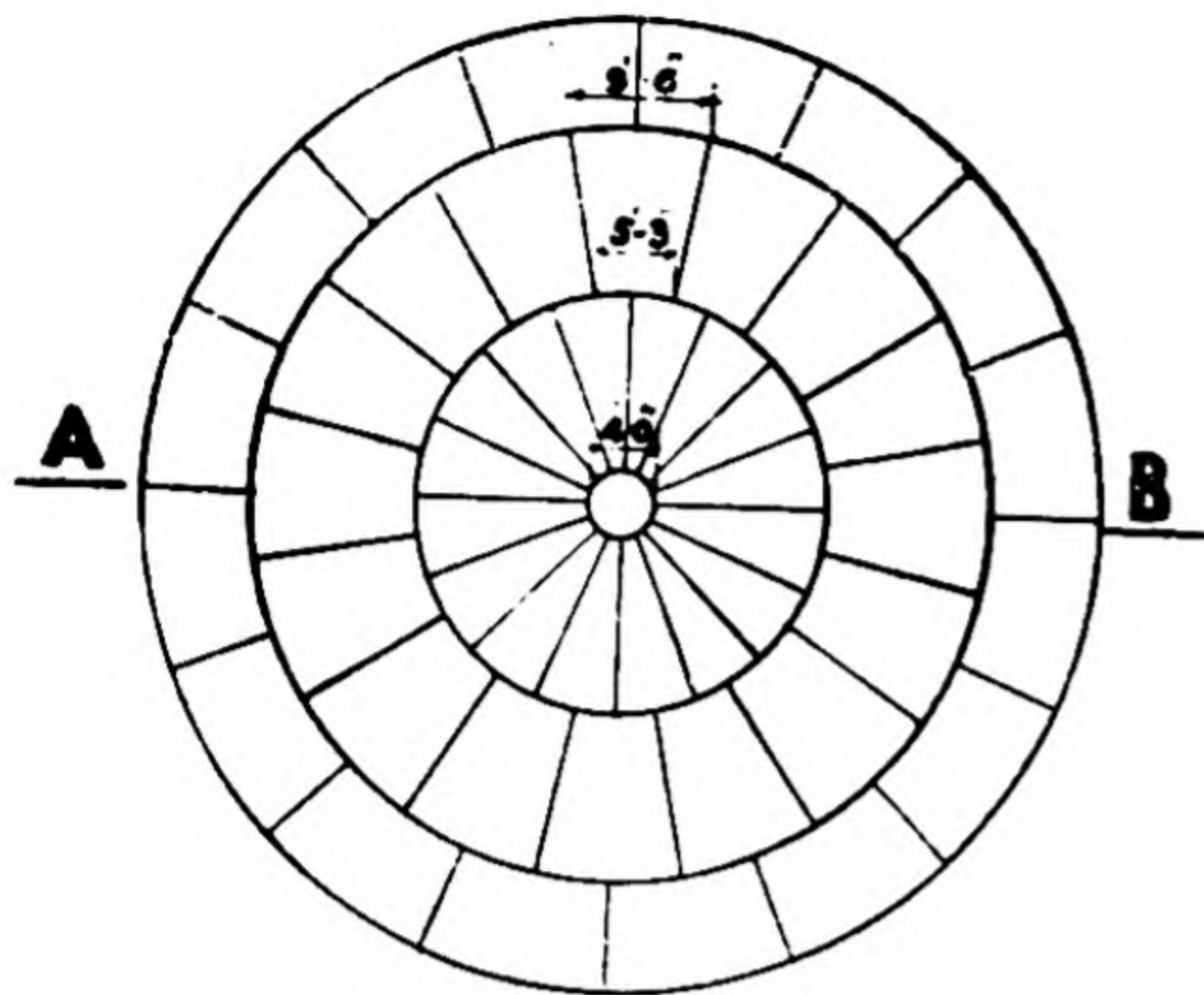


B. The Tāj: south-west chhatrī showing cribbing of the arched opening

Captain Taylor's use of coloured *chūnam* in place of the inlaid stones of the original decoration at the necking of the main dome proved a failure, as the ornamental work done by him was badly damaged during heavy rains. After a long gap of over half a century, further steps were taken in 1864 when Dr. Murray replaced a number of flowers and broken marble slabs in the octagonal tomb-chamber. In 1874 Mr. Alexander, Executive Engineer, Agra, carried out more extensive repairs amounting to Rs. 70,926. The principal items of his work were the removal of the broken marble, the substitution of new pieces in the vaulted opening, the restoration of some of the inlaid work, the regilding of the finial surmounting the main dome, the rendering of the main dome with Portland cement and the resetting of the pinnacles of the gateway which had fallen down.

Of all the works of special repairs executed in the Northern Circle of the Archaeological Survey of India during the years 1944-49 the Tāj repairs deserve special notice. Although structural defects at various component buildings had been remedied from time to time, no serious attention could be paid to a comprehensive investigation of various factors affecting the stability of the structure as a whole till 1936, when the Department, on account of the leakage of the main dome, became apprehensive of its deteriorating condition and proposed that the roofs of the second floor should be repaired, open joints filled up with suitable cementing material and the fractured marble slabs of the facade of the main dome either renewed or reset. In view of the national importance of the Tāj the Government of India considered it expedient that before approving any extensive scheme of conservation they should be fortified by the recommendations of a Committee of experts. Accordingly, one such Committee was appointed and in implementation of its recommendations extensive repairs were started in 1941 and completed in 1944 at a total cost of Rs. 92,000. The recommendations of the Committee were implemented only in so far as they related to the more urgent work on the marble facing of the drum and the dome and the inlay work thereon, leaving the rest of the recommendations to be taken up later, in the light of the report of the Expanded Tāj Advisory Committee as finally accepted by the Government of India. Full advantage was taken of the stupendous scaffolding (pl. XXIX) erected at a cost of Rs. 44,886 round the main dome and the *chhatrīs* (kiosks) in examining the monument thoroughly from inside and out and implementing all the repairs in strict accordance with the suggestions of the Committee. It was also utilized for making accurate drawings including a section of dome (fig. 1) and stress diagram of the upper dome and stripping from inside of modern plaster from the drum of the dome. Calculations based on these details convinced the Committee of the structural stability of the Tāj as a whole subject to the execution of certain important measures recommended by them. To make the dome water-tight all the stones that had bulged out or cracked were either reset or replaced by new ones in hydraulic lime mortar with stones to the full height and thickness of a course, care being taken to avoid, as far as possible, patch work, which would have looked unsightly. The joints were filled with special lime mortar consisting of marble-lime, marble-dust, *rūmī mastagī*, *batāsha* and *belgiri* water in proper proportions, while the cement mixture used in repairs consisted of 1 part cement and 4 parts of hydraulic lime or 1 part cement and 2 parts of fat lime.

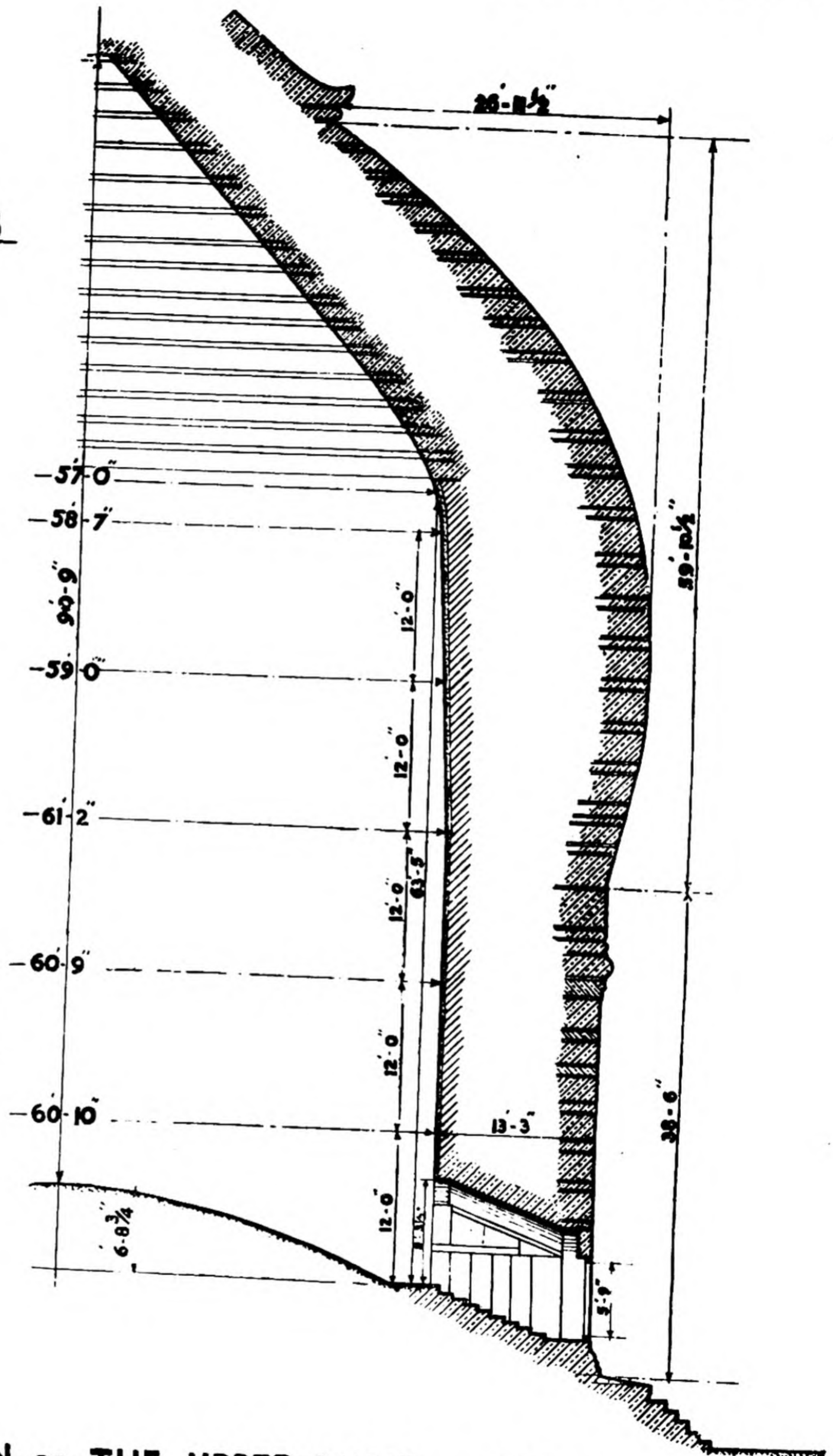
During the years 1947-49, following the recommendations of the Expanded Tāj Advisory Committee, the work of urgent special repairs to the four *chhatrīs* round the main dome was implemented. It is gratifying to record that the operation of changing the split pillars, broken lintels, *chhajjās* and other parts of the entablature of the four *chhatrīs* was successfully completed. The proposal of the original Tāj Enquiry Committee was to dismantle and rebuild all the *chhatrīs* as they were declared structurally unsound (pl. XXIX). The writer of this article, however, true to the principles of archaeological conservation, stressed on the utmost importance of the preservation of the



SECTION ON A-B

SCALE OF 8 8 32 FEET
SCALE OF 8 4 8 16 METERS

THE TAJ, AGRA



SECTION OF THE UPPER DOME AT AGRA

SCALE OF
SCALE OF

FEET
METERS

FIG. 1

original fabric to the maximum extent possible and insisted that the superstructure of the domes, being mainly intact, should not be dismantled and that the pillars and other damaged members could be changed without disturbing any part of the entablature only if the domes were properly cribbed. Thus, to rebuild the columns and replace the lintels, the dome had to be cribbed by erecting brick-in-lime piers, 4 feet 6 inches wide, in each of the eight openings, 7 feet 6 inches wide, leaving a working space of 18 inches on either side. The piers were built up to a height of 7 feet 6 inches and capped by 6 inch thick salwood lintels, running across the entire length of the opening, the intervening space of the opening above these lintels being tightly packed with masonry in lime, so as to ensure absolute and firm contact with the entablature (pl. XXX B). The task of removing the deteriorated columns (pl. XXXI A) and lintels had necessarily to be executed slowly with extreme caution and careful chiselling, while the resetting of new columns and lintels was even a slower and more delicate process, involving considerable skill and patience in establishing the closest contact of the new pillars with the entablature. In the actual execution of the work, great care was taken to see that not even the slightest void was left while resetting the new members and that the fitting of the capital, which had to be inserted last, between the shaft and the superstructure was as true and perfect as possible, for inevitably it was on establishing a perfectly firm contact that the success of the whole operation depended. The temporary masonry supports, which held the weight of the superstructure, and enabled maintenance of the original fabric, were gradually removed and the work accomplished with less than a lakh of rupees as against several times the amount which would have been spent if total renovation, as proposed by the original Tāj Enquiry Committee, was effected.

Modern accretions from the berms of the *chabūtra* of the main dome and the corner *chhatris* as well as from the parapets all round the terrace were removed and made water-tight (pls. XXX A and XXXI B). The decayed plaster to a height of 65 feet from the interior of the drum of the upper dome was also removed and the entire surface replastered with a weak mixture of cement mortar (1 cement : 10 sand), the intention being to draw out the salts. This process of eliminating salts has to be repeated every second or third year till the wall is completely free from salts when final plastering will be done in hydraulic lime. The decayed concrete from the top of the inner dome was removed. On examination it was found modern to an approximate depth of 14 to 15 inches, of which the upper shell of about 9 to 10 inches was even more loose than the stuff below it. Having removed all this about a dozen loose pockets here and there in the dome were filled to an average depth of about 12 inches and then the whole of the dome was treated with *kankar* lime concrete for a depth of 3 inches. Above this was laid another layer of cement concrete 1 : 2 : 4. In order to break the joints the inner dome has, for the purpose of the upper shell, at the apex a circle 4 feet in diameter, and from this radiate 16 equal trapezoidal panels in a concentric circle to a distance of half the diameter of the inner dome. Below this the outer diameter of the dome is again divided into 16 panels of the same trapezoidal form, but in order to break the joints the lower trapezoidal panels bisect two contiguous upper trapeziums. The panels in the upper concentric circle measure 1 foot and 5 feet 3 inches at the apex and bottom and the lower trapeziums measure 5 feet 3 inches and 9 feet 6 inches respectively. Again, the berm round this dome, of which the width is 3 feet 6 inches between the drum and the lower edge of the dome, was cement-concreted in sixteen panels which, again, in order to break the joints, start from the point of bisection of the two lower trapeziums in sixteen equal parts as shown in fig. 1. By this arrangement a great deal of load over the inner dome of which the depth, as stated above, was 14 to 15 inches on the average, was reduced, because in its place the lime concrete layer of 3 inches with the overlaid layer of $1\frac{1}{2}$ inches of cement concrete in sixteen radiating

trapezoidal quadrants was only $4\frac{1}{2}$ inches thick. The inner dome is now not only water-tight and strong but is also rid of about two-thirds of the load above it which served no purpose.

The red stone facing of the plinth of the berm of the main dome as well as that of the corner *chhatris* were also thoroughly repaired. In the latter the decayed *dābs*, *kaias*, *galtāns* and panels had to be replaced only here and there, whereas in the plinth of the main dome as many as fifty stone panels and all the carved *dāsas* on the coping, besides many pieces of *dābs* and *kaidas* etc., had to be replaced by new ones. The rich carving of the *dāsas* was made to conform with the original. The total amount spent on the special repairs to the Tāj during 1947-48 and 1948-49 was Rs. 55,877 and Rs. 61,700 respectively.

A tubular scaffolding which will facilitate future repair works at the Tāj has been procured at a cost of Rs. 11,000. This, besides being economical in the long run, will surely prove more dependable than the *balli*-scaffolding and also easier to erect.

The problem of clearing dirt and dust-strains from the marble at the Tāj still remains to be tackled and the Archaeological Chemist has been asked to initiate adequate measures for this.

THE GREAT 'ĪDGĀH

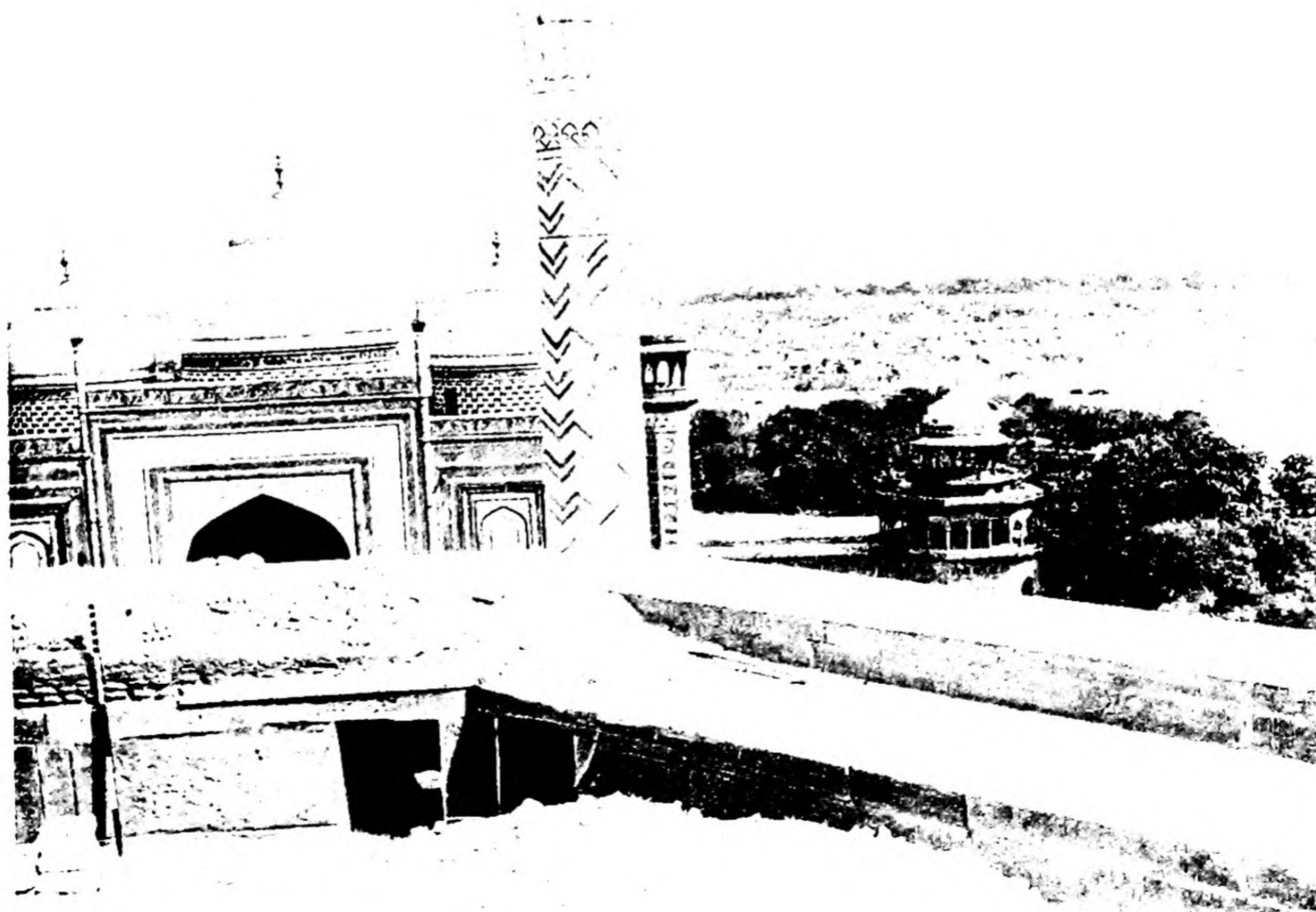
The 'Īdgāh, or the mosque where 'Īd prayers are offered twice a year, stands on the north side of the Ajmer Road near Muhalla Qutlupur at Agra. It is a red sandstone building and covers an area of about 570 by 530 feet enclosed by high embattled walls and corner-towers. Its west wall contains an inscribed tablet, set up in 1293 A.H. (A.D. 1876), which assigns its original construction to Emperor Shāh Jahān in forty days and its restoration to Nawāb Kalb-i-'Alī Khān of Rampur in 1293 A.H. (A.D. 1876) under the superintendence of *Sadru's Sudūr* 'Abdu'l-Qayyūm. But on stylistic grounds it is assignable to Emperor Aurangzeb (1658-1707), and since very few of his monuments are known to exist the preservation of the 'Īdgāh has been one of the chief concerns of the Archaeological Department.

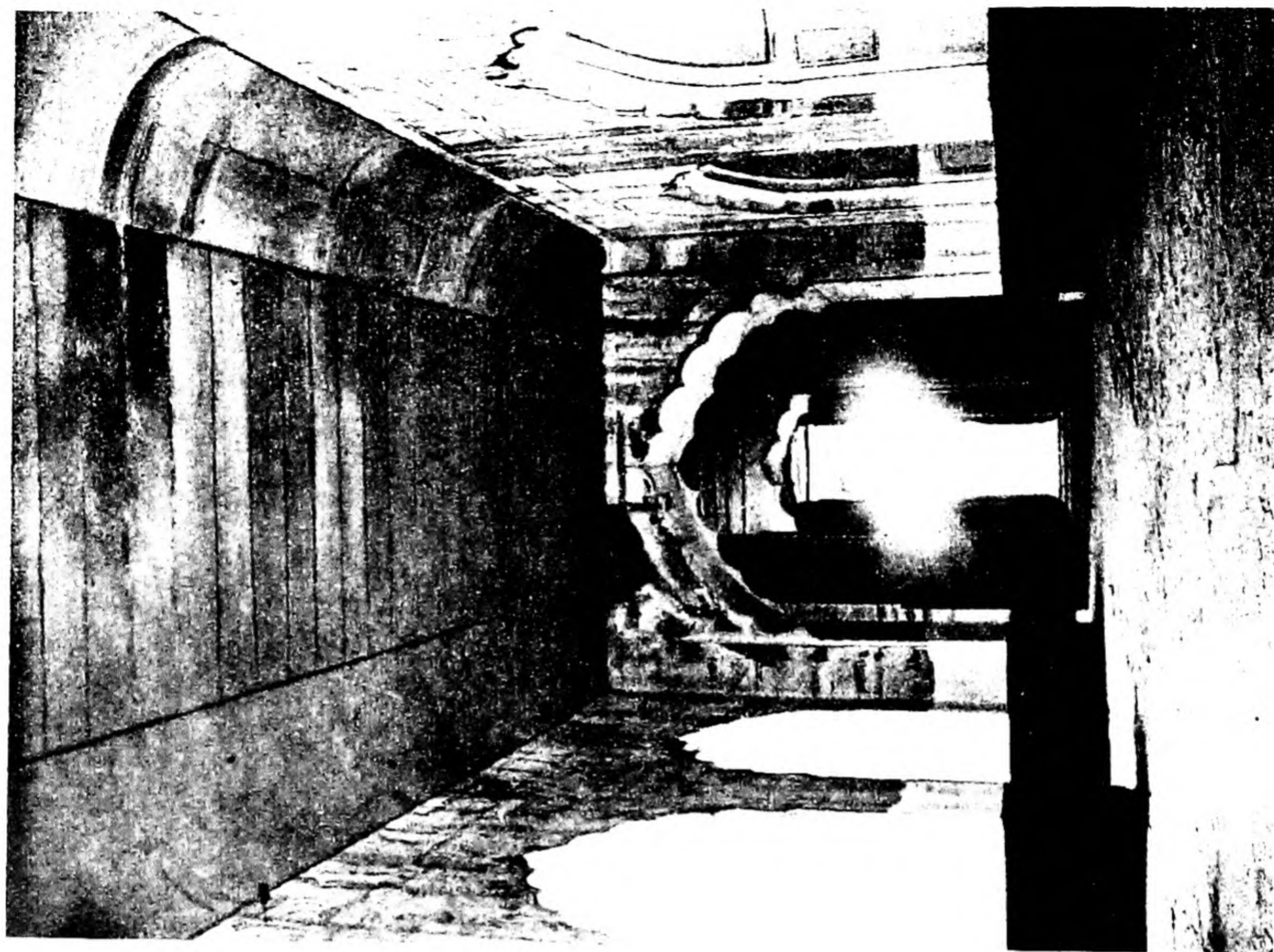
The roof of the northern compartment of the 'Īdgāh suddenly collapsed on the 10th January, 1940, and enabled the details of its construction to be closely examined to find out the real cause of damage (pl. XXXII A). After mature consideration, following technical discussions with the Central Public Works Department as well on this point, I decided to restore a portion of the roof as an experimental measure in strict accord with the principles of Mughul construction. The original structure really resembles a sort of built-up arch consisting of two arched segments or coving (*gardana*) springing from the walls on either side and closed at the centre by keystones of large size, each 15 feet $4\frac{1}{2}$ inches long. The *gardana* consists of a brick core¹, with stone facing, strengthened from behind by stone struts, and this is broken at regular intervals by huge stone brackets into which the ends of face-stones have been inserted by means of tongue-and-groove joints. The face-stones, again, are tied back into the masonry by strong iron hooks, while its upper course is bound to the lower one by means of long iron cramps. Over the upper edge of the *gardana* and the brackets is placed the skew-back which establishes a continuous, firm and complete contact with the roof slabs and brings them into perfect compression so as to make them serve as keystones. The *gardana* or coving is essentially made up of all the parts enumerated above, every part contributing in its own way to joint action for the stability of the construction.

¹ Backed by coursed masonry this ends in a continuous arch, 1 foot 6 inches thick, which accords with the curvature of the stone-facing.



A. *The Tāj: north-east chhatrī showing a badly split pillar*



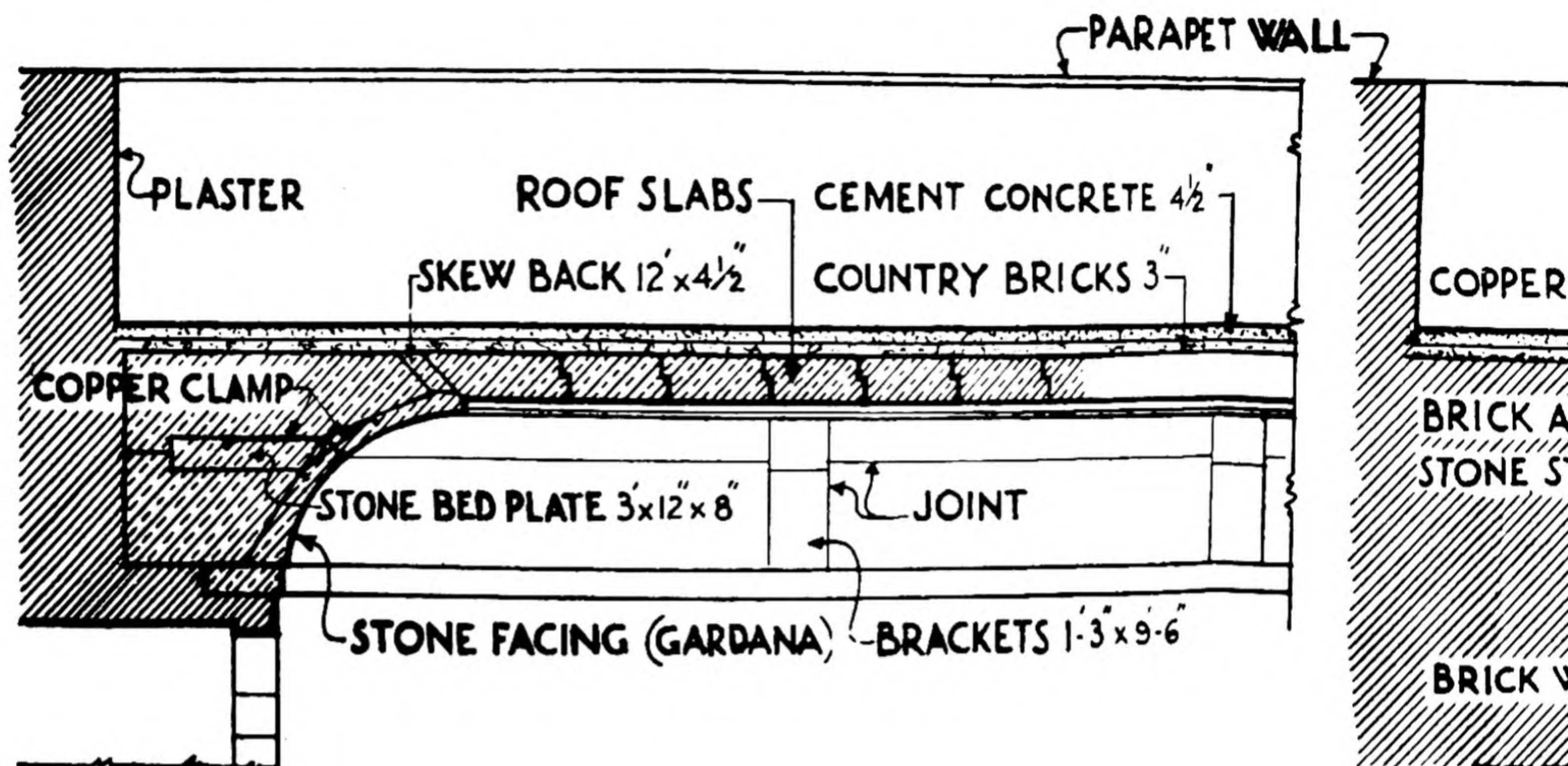


B. 'Idgāh showing the roof of the northern compartment
after restoration

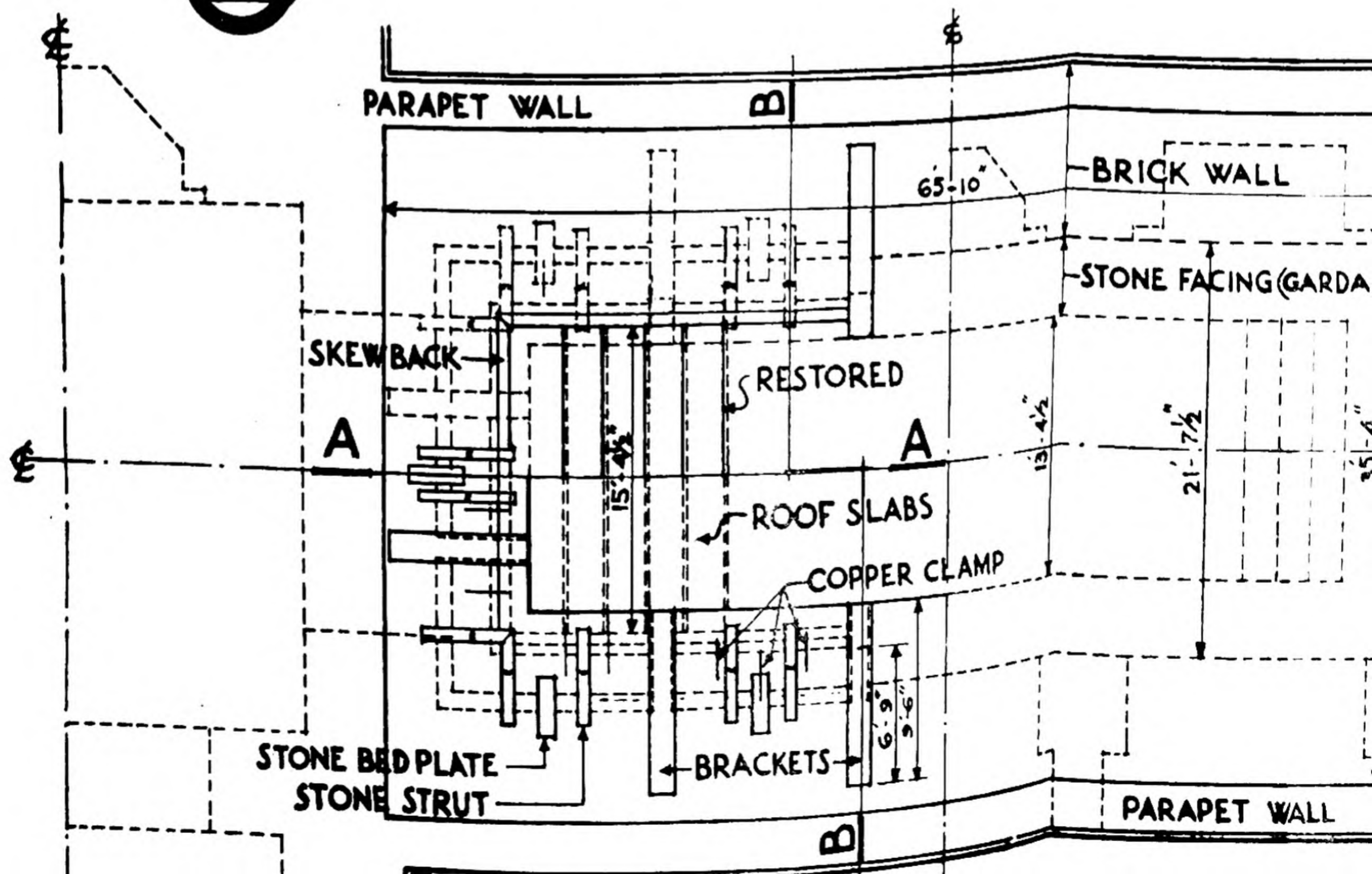


A. Agra. 'Idgāh showing collapsed roof of the northern
compartment

To face plate XXXII



SECTION ON A-A



It will appear from the section, plate XXXIII, that the roof-slabs or key-stones along their sloping ends were in compression for about four-fifths of their upper thickness against the skew-back which, in its turn, rests directly on the heads of the brackets or the face stones, both of which are cut back in a continuous slope to the alignment of the skew-back for a thickness of about $4\frac{1}{2}$ inches. It will thus be clear that for about one-fifth of their lower thickness the roof slabs were in compression directly with the lower ends of the brackets or the sloping portions of the face-stones immediately below the skew-back and, therefore, to the extent and at points, where such parts of the brackets or the face-stones had lost contact with the roof slabs, to the same extent the key-stones acted like beams, introducing an element of unsafety into the construction.

Having understood all the details of construction and following the same principles faithfully, the roof was rebuilt to a length of 32 feet 2 inches at a cost of Rs. 11,574 (pl. XXXII B). The work included dismantling and rebuilding of all the parts of the *gardana* in the entire breadth of the compartment on the south side and for a length of 21 feet towards the north. Best quality stones for the work were specially quarried from Tāntpūr, in Dholpur (Rajasthan), to match with those still *in situ*. The roofs of the other two compartments also show signs of decay. They have been propped up for the present with brick pillars, and it is intended to re-roof them as soon as funds are available.

THE FORT

The Agra Fort was built by Emperor Akbar in about eight years (A.D. 1565-73) at a cost of 35 lakhs of rupees under the superintendence of Muḥammad Qāsim Khān, *Mir-i-Bahr* or harbour-master. According to Abu'l-Fazl (*Āin-i-Akbarī*, Persian text, I, p. 441), there were more than five hundred elegant buildings of Bengal and Gujarat style in the Agra Fort, but they are no more to be seen. The present position in respect of the existing buildings in the Fort is that, roughly speaking, Akbar was responsible for the construction of its walls and gates and the Akbarī Maḥal, Jahāngīr for the Jahāngīrī Maḥal and possibly Salimgarh, Aurangzeb for the Sher-i-Hāji or ramparts, five gateways and the fosse outside, while most of the principal edifices in it were erected by Shāh Jahān. The Khās Maḥal (chief palace), called *Ārāmgāh-i-Muqaddas* ('holy abode of rest') in contemporary histories, was built about the year 1637 by Shāh Jahān and probably comprised the main marble structure (extensive special repairs to which will be described below) with its North and South Pavilions, the Angūrī Bāgh (grape garden), the two-storeyed apartments round the grape garden as its residential quarters and the Shīsh Maḥal (palace of mirrors) as its baths. Another beautiful structure which comes within the purview of this article on account of extensive repairs executed to it is the Dīwān-i-Khāṣ (or Hall of Private Audience), built by Emperor Shāh Jahān for the reception of kings, ambassadors and nobles in private audience and for the transaction of the most important affairs of state with the help of their councils. The *Umarās* were compulsorily required to present themselves here or something of their pay was retrenched. On the occasion of the investiture of Amīr Ḥabību'llāh Khān of Afghanistan with the Order of the Bath in January 1907 the Dīwān-i-Khāṣ and the Khāṣ Maḥal were specially decorated and illuminated and the former served as a supper-room for the royal guest.

The two major repair works carried out at the Agra Fort during the years 1946-49 relate to the renewal of the ceilings at the Khāṣ Maḥal and the Dīwān-i-Khāṣ mentioned above. The ceiling of the front *dālān* of the Khāṣ Maḥal (57 feet by 17 feet 3 inches) consisted of small marble slabs, about 3 feet by $1\frac{1}{2}$ feet, inserted into the lower flanges of plate girders, 20 in number, each placed 3 feet apart, while red sandstone slabs resting on the upper flange of the plate girders overlaid with 7 inch lime concrete formed the

roof. The rusting of the plate girders had caused fractures in over a hundred marble slabs of the ceiling. To renew them, it became essential to dismantle the entire roof and ceiling, clean the girders of rust, render them fit for further use by applying three coats of thick cement wash, re-set the old serviceable slabs and replace the unserviceable ones and lay fresh concrete over the roof slabs. This operation necessitated the erection of two parallel masonry walls running all along the length of the verandah to a height 1 foot lower than the ceiling for the use of workmen. This work was completed in the year 1946-47 at a cost of Rs. 21,322.

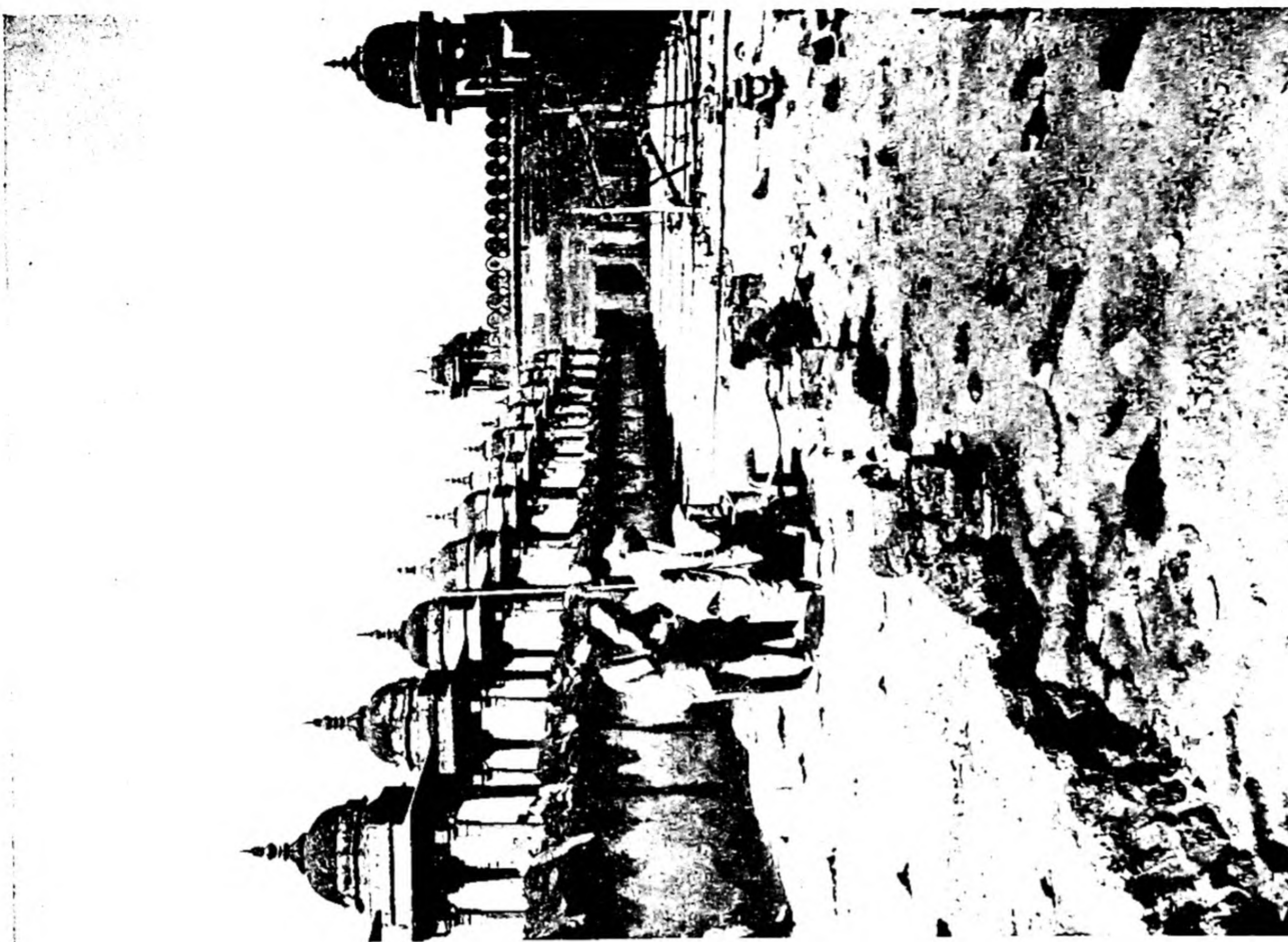
At the *Dīwān-i-Khāṣ* also the nature of the work was the same as at the *Khāṣ Mahal* and involved the same technique. But here care had to be taken to avoid direct load on the roof of the *Shīsh Mahal* underneath the *Dīwān-i-Khāṣ*, and so the walls referred to above were carried over R.S. joists inserted into dwarf piers built for the purpose in the arched recesses in the side walls. Across these temporary walls two heavy girders were placed touching the ceiling stones to enable their being taken out safely. The plate girders, as at the *Khāṣ Mahal*, were cleaned of rust and given three coats of thick cement wash. Advantage was taken of the scaffolding in renewing 30·8 square feet of richly carved marble coving of the inner hall and at thirteen other places patch work was done including seven pieces richly carved. Sixteen marble *chhajjā* slabs were replaced. Other items of structural importance such as pointing the ceiling and *gardanas* with special marble lime mortar and plastering the parapets, were also attended to. Marble for the work, both at the *Khāṣ Mahal* and the *Dīwān-i-Khāṣ*, was imported from Makrāna (Jodhpur). This work was carried out during the years 1947-49 at a total cost of Rs. 32,733.

THE DARGĀH AT FATEHPUR SIKRĪ

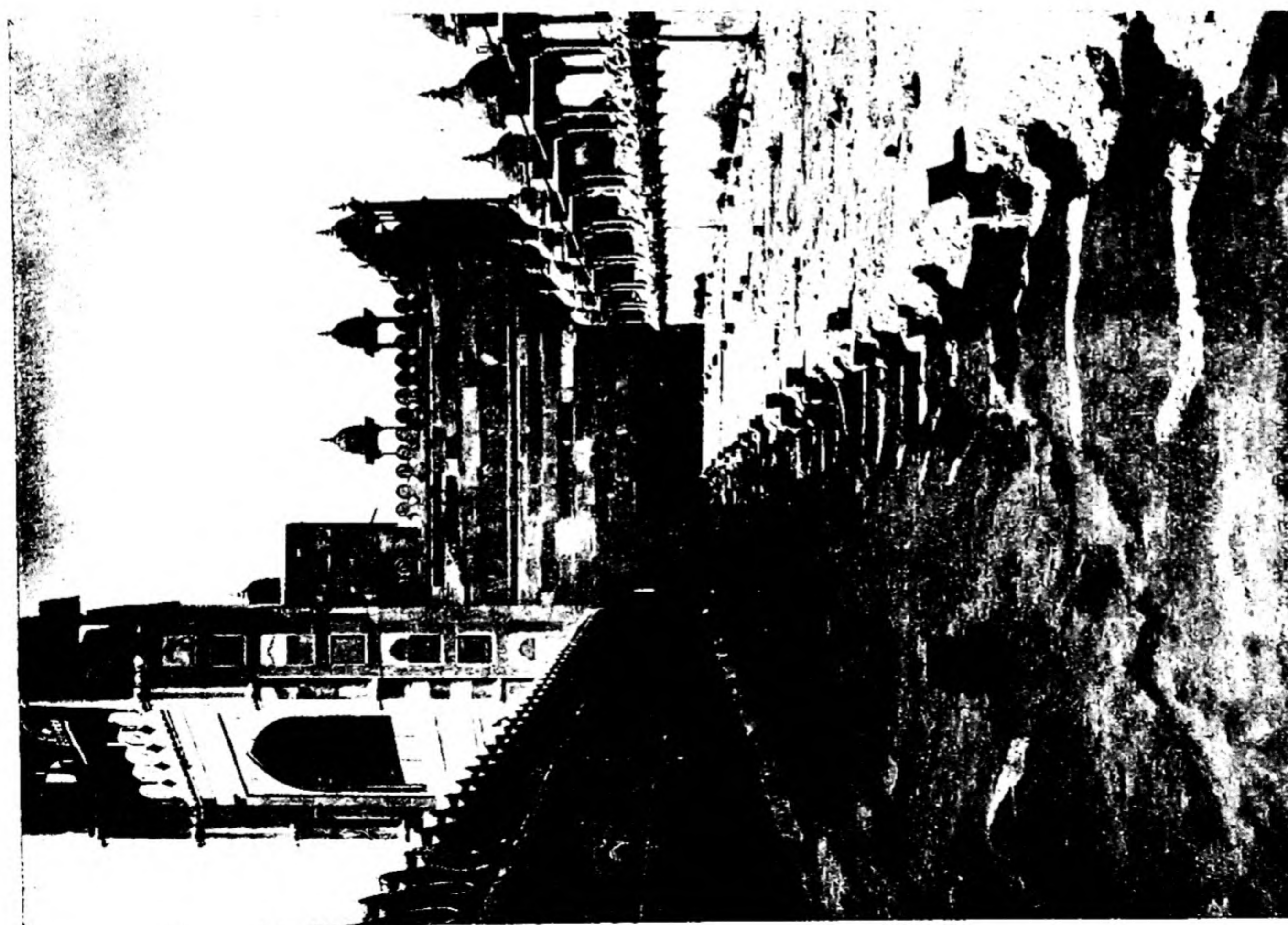
The Dargāh of Hazrat *Shaikh Salīm Chishtī* at Fatehpur Sikrī is an extensive walled enclosure comprising the *Jāmi'* Masjid on the west, the cloisters consisting of numerous cells preceded by an arcaded corridor on the south, east and north and a spacious courtyard wherein stand the exquisite white marble tomb of Hazrat *Shaikh Salīm Chishtī*, the patron saint of Fatehpur Sikrī, and the tombs and graves of the members of his family. It is reached by two stately gateways approached by broad flights of steps on the south and east sides. That on the east is the *Bādshāhī Darwāza* or King's Gateway, so called because it was the one through which Emperor Akbar passed every morning on his way from the palaces to the service in the mosque. The other on the south is the *Baland Darwāza*, or the Lofty Gateway, about 176 feet high from the ground below and about 134 feet high from the pavement in front of the main entrance. Although the *Baland Darwāza* did not form part of the original design and was erected after the completion of the mosque by Akbar in 983 A.H. (A.D. 1575-76) as a triumphal arch to commemorate his victory in the Deccan, it is regarded by competent authorities as one of the most perfect architectural achievements in India. It is the highest gate in India and one of the highest in the world. According to Mullā 'Abdu'l-Qādir Badāyūnī (*Muntakhabu't-Tawārīkh*, Persian text, II, p. 109) the Great Mosque and the *Khānqāh* of the *Shaikh* (which enclosure comprises the whole of the building, now called the Dargāh, minus the tomb and graves built therein afterwards) were built by Emperor Akbar for *Shaikh Salīm Chishtī* in the course of five years¹, while Emperor *Jahāngīr* states that a sum of 5 lakhs of rupees was spent on the mosque from the royal treasury.²

¹ The soffit of the archway in front of the prayer-chamber of the mosque has an inscription giving the date of the erection of the mosque 979 A.H., A.D. 1571-72.

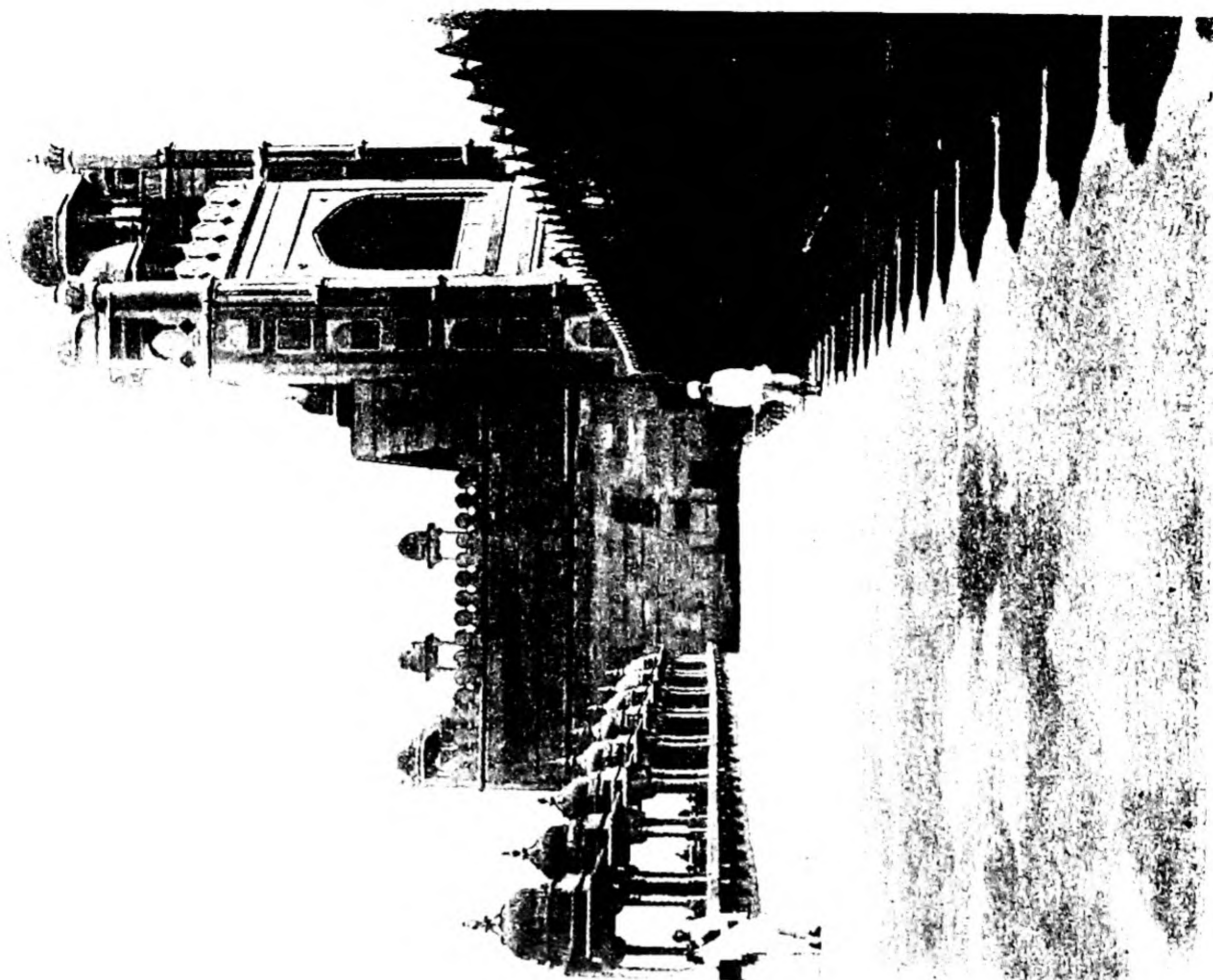
² *Tuzuk-i-Jahāngīrī*, Persian text, Allygarh edition, p. 262.



*B. Darwāz Complex : roof south of Bādshāhī Darwāza
showing dismantled terrace*



*A. Fatchpur Sikrī, Darwāz Complex : roof east of Baland
Darwāza, showing dismantled terrace*

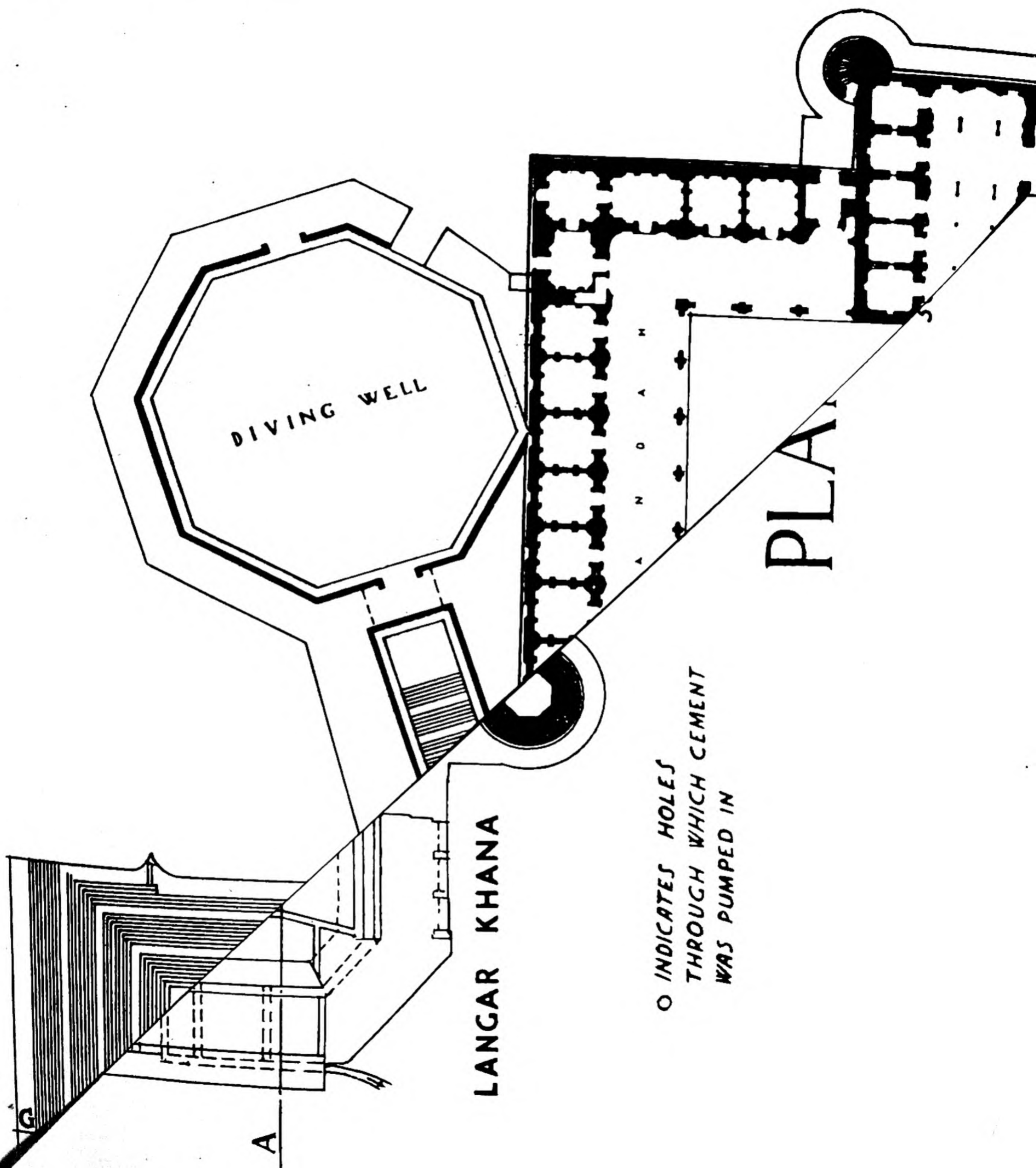


B. Dargāh Complex : view of the roof to west of Baland
Darwāza, after conservation

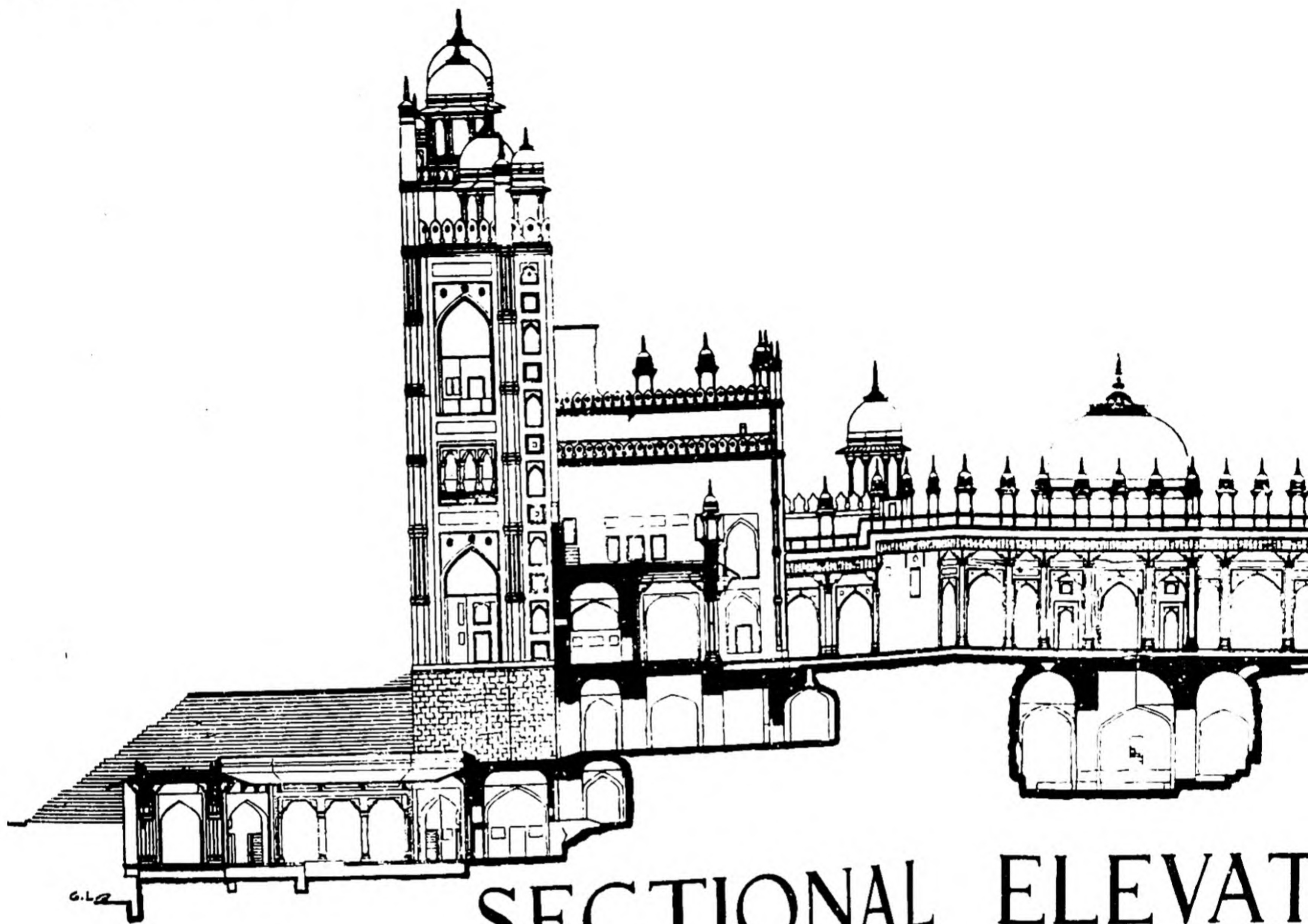


A. Dargāh Complex : view of the roof showing work in progress
over the southern half of east side

To face Plate XXXV



To follow plate XXXVI



SECTIONAL ELEVATION LOOKING WEST

SCALE OF 10 0 20 40 60
SCALE OF 5 0 10

The cracks and crevices in domes and walls of the compartments flanking the Baland Darwāza and the Bādshāhī Darwāza, in fact the whole of the southern half of the Dargāh complex measuring 602 feet by 33 feet, as well as the marble tomb of Shaikh Salīm Chishtī which had also been leaking at some places, needed immediate attention to save the structures from further deterioration and ultimate collapse (pl. XXXVII). Since the south wall and the southern part of the east wall had perceptibly tilted out and endangered the safety of this majestic monument, an elaborate scheme of conservation was drawn up and the work completed in the course of three years (1945-47) at a cost of Rs. 51,200. Special mention in this connection must need be made of grouting with cement of all the cracks and crevices. Cement to the extent of 2,034 bags—far higher than the estimated amount—had to be pumped in, because in the course of repairs many of the cracks were found much larger than could be anticipated. To give an idea of the magnitude of repairs to the terrace over the compartments in the southern half of the Dargāh it may be mentioned that 600 tons each of rubble and concrete had to be used (pls. XXXIV A and B and XXXV A). At the marble mausoleum of Shaikh Salīm Chishtī the entire roof was made water-tight by relaying most of its concave. The drum and the dome were pointed with marble lime mortar of special composition (1 part lime : 2 parts marble dust : 1/16 *rūmī mastagī*, 1/16 part *dāl urd* and 1/16 part *batāsha*). The same mortar was also used in resetting the dislodged parapet and coping on all sides except the south. A fresh layer of lime concrete was laid on the entire terrace (pl. XXXV B), top of parapet walls along the inner perimeter of the roof, the topmost parapet of the south face and on the roofs of the second floor of the Baland Darwāza.

The *birkha* (underground tank in the courtyard of the Dargāh) has been made water-tight by relaying its entire bed with lime concrete and replastering the walls all round to a height of five feet.

Special attention was given to the non-functioning of the network of drains in the south-east part of the Dargāh complex and the Langar Khāna below (pl. XXXVI). These, with a varying depth of 1 foot to 3 feet 6 inches and width 2 feet, were thoroughly repaired to a length of 1,000 feet and made to function properly. Sunk pavement in the courtyard of the Dargāh was relaid in patches to the extent of 14,000 square feet after renewing the lime concrete and decayed stones where necessary. At the Langar Khāna, which buttresses the east part of the south face of the Dargāh, the facing was thoroughly pointed and the cells extensively repaired. The walls of the roofless east *dālān* were made water-tight and all the roof drains, which were found choked, repaired and made to function, so that they again carry water to the underground drainage, which was exposed and thoroughly repaired. The courtyard was reduced to its original level and it is proposed to cover the underground drains with stone slabs properly dressed. Rain-water no longer collects in the depressions and is easily drained off by the network of underground drains.

The basement cells on all the four sides of the Dargāh complex and the rubble stone masonry below the steps leading to the Baland Darwāza were strengthened by extensive pointing and underpinning. Special attention was paid by way of wholesale grouting to the south-east part of the verandah from which cement was pumped under pressure right down to the cells below. Modern accretions against the north wall of the Dargāh were dismantled and necessary repairs executed to the wall. All the open joints in the inner face of the Baland Darwāza were pointed right up to the top. It still remains to procure and fix strong tie-rods, 1½ inch square in section, all along the south side and the southern part of the east side of the Dargāh in order to bind the walls together which, at these places have bulged out so as to form distinct bows.

AN INSCRIBED BODHISATTVA IMAGE FROM MATHURĀ

By T. N. RAMACHANDRAN

In this paper Mr. T. N. Ramachandran describes an inscribed image of red sandstone from Mathurā and draws attention to its identification as the Bodhisattva Siddhārtha, to the robe worn by the Bodhisattva displaying brocade design as in the case of the statues of Kanishka [A.D. 78-101 (?)] and Vima Kadphises [A.D. 40-78 (?)] and, being closely related to the old central Asian Scythian dress, to the inscription (unfortunately mutilated) being a votive record (in Brāhmi script and Sanskrit language) giving the name of the donor as the householder Nāgadina (Nāgadatta) and to both style of sculpture and palaeography of the inscription pointing to early second century A.D. as the possible date of the image.

MR. Ajit Ghose, a distinguished lawyer and scholar of Calcutta, who is famous for his collection of antiquities and paintings, has an interesting headless sculpture (image) from Mathurā which is also inscribed. The circumstances that led to its acquisition are that Mr. Ajit Ghose purchased it from a private man in Agra who found it some 25 years ago near Mathurā while digging for the foundations of a house. The image which measures 1 foot × 1 foot × 3 inches is of first class importance to the study of early Indian sculpture and epigraphy (pl. XXXVIII).

The sculpture, which is of the red sand stone variety common in Mathurā, has unfortunately suffered from age, age-long neglect and rough use to which it appears to have been subjected before it came into Mr. Ajit Ghose's hands. It reveals on its back a smoothened surface and a wide and gradual depression in the centre such as would result by its use for grinding or pounding purposes. For the same reason the lower part of its front which represents a rectangular pedestal (*pīṭha*) slightly projecting forward has also suffered and its surface has got smoothened. This is unfortunate as this part originally contained an inscription in two or three lines as in the case of some Mathurā Buddha, Bodhisattva and Jina reliefs already known. Faint traces of a *pa* in the first line and a *ra* and *na* in the second line alone remain now to give us the sad tale of the annihilation of the whole record at the hand of vandalistic grinders and chutney-pounders.

Luckily, like the *madhu-bindu* or 'the drop of honey' of Jaina Cosmology, something is left on the torso part of the figure, in front and on its right and left sides, from which we can recapture the content and the intent of the figure sculptured. Those that had mutilated the inscription did not spare the head, and we have only a headless figure left to determine whether Buddha was meant or the Bodhisattva (Prince Siddhārtha). Luck does not fail us here either, for the lower hanging (tassel or drop) of a *kundala* of the right ear is left as a solitary clue to determine that the Bodhisattva was the spirit of the sculpture. It is easy, at first sight, to imagine that the Buddha was meant and in this hypothesis, other known figures of Buddha seated in *dhyāna* figured by L. Bachhofer in his *Early Indian Sculpture*¹ will help. But the survival of the faint *kundala* of the right ear proves that the Bodhisattva was the *lakshya*. The pose of the Bodhisattva seated with hands folded on the lap in meditation (*dhyāna*), his dress (*saṃghāṭi*) completely covering both the shoulders with a ridge mark below the neck and adjusted like a half circle in the centre over his folded

¹ Part II, fig. 86.

feet and the *saṃghāti* or *chīvara* placed in an elegant flow over the right and left hands are some characteristics of our figure which mark it out as a good study of symmetry (cf. *symmetria prisca* of Leonardo da Vinci). These features are also strikingly present in a Buddha image from Mathurā of the second century A.D. now in the Lucknow Museum.¹ But the Lucknow Museum Buddha has the usual robe of wavy lines and sits on a *padmāsana*, while our Bodhisattva has a plain rectangular *āsana* and has a robe of brocade-design as in the case of the statues of Vima Kadphises and Kanishka in the Mathurā Museum of A.D. 40-78 (?) and 78-101 (?) respectively.² According to Bachhofer such drapery is very closely related to the old Central Asian Scythian dress.³ The *brocaded drapery* that is associated with our Bodhisattva figure is more like that of the figures of the Kushan kings Kanishka and Vima Kadphises than like the chequered robes that Buddhist monks are sometimes shown as wearing in the sculptures of Amarāvati and others of the first to third centuries A.D.⁴ The monks' robes that occur in Amarāvati are more suggestive of rags all sewn together, resembling, according to Rhys Davids, 'a field cut up by rows of boundaries that served also as water channels', than the rich brocaded robes, with the squares, symmetrically arranged on them such as we see both in our Bodhisattva figure and in the statues of the Kushan kings, for which reason, it is easy to distinguish our figure as a prince, or to speak correctly Prince Siddhārtha who was a *Bodhisattva* before he became the Buddha. Having been executed during the Kushan rule the figure bears the marks of Kushan drapery.

While the upper limit of its date is furnished by its similarity with the statues of Kanishka and Vima Kadphises as A.D. 40-78, its lower limit is supplied not only by its similarity to the Buddha figure in the Lucknow Museum of A.D. 130-140,⁵ but also by the palaeography of the remnants of the inscription on the two sides of the pedestal of the figure (pl. XXXIX). The script is Brāhmī and the language Sanskrit.

What remains of the inscription on the sides can be read as follows :—

RIGHT SIDE

hi ta su khā r(tha)m

LEFT SIDE

Line 1. *Nā gā di na sya*

Line 2. *gra(ḡi) ha dha ra sya*

'(The gift) of the householder (?) Nāgadina (Nāgadatta)—for the welfare and happiness of.....'

What remains of the inscription shows that it is a votive record giving the name of the donor as a householder(?) Nāgadina for the welfare and happiness of (all creatures including himself and his family). Though *gṛihādharasya* must normally occur before *Nāgadinasya*, being an adjective (*viśeshana*), its appearance as here is not uncommon in prose, while in poetry it is frequent. It is easy to add *artham* after *sukha* as it is a contraction of the known formula *hitasukhārtham bhavatu*. And this form occurs in the Kushan inscriptions of the second century A.D. in Sānchī.⁶ The name Nāgadina also occurs in a Sānchī inscription⁷ which reads as *seṭhino Nāgadinasa dānam*. Nāgadina (Nāgadatta)

¹ L. Bachhofer, *Early Indian Sculpture* (New York), fig. 86.

² *Ibid.*, figs, 76, 77.

³ *Ibid.*, part II, fig. 77.

⁴ Sivaramamurti, *Amarāvati Sculptures* (Madras, 1941), pl. IX, fig. 14.

⁵ Bachhofer, *op. cit.*, fig. 86.

⁶ J. Marshall, A. Foucher and N. G. Majumdar, *The Monuments of Sānchī*, p. 386 and pls. 53, 105c, 138.

⁷ G. Bühler, 'Inscriptions of Sānchī', *Epigraphia Indica*, I (1892), II, p. 109, no. 115; H. Lüders, *A List of Brāhmī Inscriptions*, nos. 28, 171, 235 and 431.

and Yakhadina (Yakshadatta) are names which have been explained as bearing witness to the prevalence of the Nāga and Yaksha cults.¹

Though it is *gra* in the inscription *grahadhara*, I take it that *gri* was meant. *Grahadhara* may mean one who supports or deals with the planets (*grahas*). But with *gra* corrected as *gri* we have *grihadhara* meaning perhaps 'householder', which Nāgadina, the donor, probably was. *Grihadhara* perhaps corresponds to *gahapati* meaning 'householder' occurring in Amarāvati inscriptions² and elsewhere. The characters closely resemble those of the later Kushans³ and on grounds of palaeography the lower limit of the date of the sculpture can be said to be the latter half of the second century A.D. The evidence of style would place it between A.D. 40 and 140. Thus both style of sculpture and palaeography of inscription would help to assign the image to early second century A.D.

¹ Marshall, Foucher and Majumdar, *op. cit.*, p. 299.

² Sivaramamurti, *op. cit.*, p. 272.

³ *Epigraphia Indica*, IX, p. 242.



Inscribed Bodhisattva image from Mathurā



A



B

Inscribed Bodhisattva image; A, right side; B, left side

TECHNICAL NOTES

THE RED PAINT, LIME-WASHES AND PLASTERS ON BHUVANESWAR AND KONĀRAK TEMPLES

By T. R. GAIROLA

RED PAINT ON THE MUKTEŚVARA TEMPLE

SOME of the important temples at Bhuvaneswar and a few sculptures of the Konārak temple, Orissa, appear to have been coated white, plastered and painted red. M. M. Ganguli¹ says that the red paint does not seem to be a simple compound but a complex mixture of several ones in definite proportions, and in his support quotes from the *Bṛihat-saṃhitā* (lvi, 1-3), which states that the paste is composed of the precipitate of unripe *tinduka* and *kapitthaka* (*katbelā* in Hindi) fruits, blossom of *śālmālī* (silk-cotton, etc., boiled in a quantity of water and mixed finally with exudation of *sarja* tree or turpentine, resin, linseed etc. The possibility of another paste consisting of *lākshā* (lac), the kernel of the *bel* fruit, turpentine etc. is also entertained by him.

A sample of the red paint from the Mukteśvara temple at Bhuvaneswar was found on analysis to be free from organic matter. Nitrogen, as tested by Lassaigne method, was found absent and no carbonaceous matter could be detected. It was found to contain 36·42 per cent of Fe_2O_3 which accounts for the red tint. A sample of red ochre was collected from the Bhuvaneswar market for comparison with the red paint from the Mukteśvara temple and was found to contain 58·8 per cent of Fe_2O_3 , being free (like the red paint) from manganese oxide (MnO), a common impurity in haematite. The ferric oxide content shows that it is not a high grade local red ochre, which is reported to contain about 84 per cent to 91 per cent of ferric oxide.² The analytical data of the two samples are given below for comparison :—

Samples	-H ₂ O	+H ₂ O	Sand and clay	³ Fe ₂ O ₃	MnO	CaO	MgO	TiO ₂	P ₂ O ₅	SO ₃	Total
Red paint from Mukteśvara temple ...	1·95	16·42	40·97	36·42	Nil	2·24	1·17	...	...	1·56	100·73
Red ochre from Bhuvaneswar market ...	2·01	8·42	28·90	58·80	Nil	1·10	·13	Nil	Nil	Nil	99·36

¹ *Orissa and Her Remains* (Calcutta, 1912), pp. 253ff.

² J. Coggin Brown, *India's Mineral wealth* (Oxford 1936), pp. 106ff. The Fe content of Orissa haematite is 60%-64%; therefore Fe_2O_3 is 84%-91%.

³ These figures include Al_2O_3 if any.

From the figures of the above table, it can be inferred that the red paint on the Mukteśvara temple was either a poor quality of red ochre or a mixture of clay with a high grade local red ochre (haematite)¹ free from manganese oxide. For tinting the blocks of stones, the powder was crushed fine, mixed with plain water and the blocks dipped in this solution or painted with a brush. In some cases the red paint was applied after lime-wash. Different shades of red can be obtained from iron oxides and have been given various trade names, i.e., Chinese red, Naples red, Terra Rosa², Indian Red, Light Red, etc.³ Thus the results of the analysis do not lend support to the conjectures of Ganguli.

WHITEWASH AND PLASTER

Lime and gypsum are commonly employed in whitewashing, plasters and mortars. To know what was the composition of the white coatings on the Bhuvaneswar group of temples, the examination and analyses of a few samples were taken up, and it was found that lime had been applied on the temples in different stages, as there were distinctly separate thin layers. On the sculptures of the Liṅgarāja temple there is a layer of thin lime-plaster, probably meant to hide bad workmanship.⁴ The proportion of lime to sand in this plaster is 3 : 1. The thin white coatings on the Paraśurāmeśvara and Mukteśvara temples and on the Konārak one are very rich in lime content ($\text{CaCO}_3 + \text{MgCO}_3$ being 90.59 per cent, 96.63 per cent and 91.54 per cent respectively) and do not seem to contain any intentionally added sand. These are therefore simple lime-washes—each wash being represented by one separate coating. The number of these coatings differs in different temples and sculptures. From chemical analyses it is difficult to say whether the source of this lime is shell, limestone or *kankar*.⁵ The lime-plaster from inside the *vimāna* of Konārak is .56 cms. in thickness and consists of 4 parts of lime and 3 parts of sand. This is a coarse plaster and forms the first coat on the stone-surface. The plaster is contaminated with chlorides because the monument is situated near the sea. The tables below give the analyses of the above samples of lime-wash and plasters as well as the analyses of a few specimen of plaster from Nālandā, Mohenjo-daro, Harappā and Egypt, included here for comparative study.

¹ D. N. Wadia, *Geology of India* (London 1919), p. 302.

² J. W. Mellor, *Inorganic and Theoretical Chemistry*, III, Fe, (Pt. II), (London 1923), p. 782.

³ *Technical Studies* (Lancaster, Pennsylvania), April 1939, pp. 230 and 235.

⁴ Ganguli, *op. cit.*, p. 259.

⁵ Brij Narayan, *Detailed Specifications for Orissa* (Orissa, P.W.D.)

TABLE I

Locality, specimen and rough date	-H ₂ O	Clay and sand	Fe ₂ O ₃ etc.	CaO	MgO	P ₂ O ₅	SO ₃	Cl	CO ₂ & H ₂ O	Total	Remarks
Lime-wash, Pa-raśurāmeśvara temple, seventh-eighth century	·79	7·27 ¹	1·84	49·22	1·14	Tr.	·63	Tr.	39·38	100·57	CaCO ₃ = 87·61 MgCO ₃ = 2·98 90·59
Lime-wash, Mukteśvara temple, eighth century	nil	4·62 ¹	·95	53·72	·48	...	·56	Tr.	40·32	100·65	CaCO ₃ = 95·62 MgCO = 1·01 96·63
Lime-wash, figure on <i>jaga-mohana</i> Konārak, thirteenth century	·84	1·46 ¹	1·50	51·16	·24	Nil	0·5	Tr.	44·24	99·49	CaCO ₃ = 91·06 MgCO ₃ = ·48 91·54
Plaster, Linga-rāja temple, tenth century	·68	19·26 ¹	5·62	37·30	3·12	Nil	·78	·23	33·31	100·30	CaCO ₃ = 66·39 MgCO ₃ = 6·35 72·74 = 3 : 1 Lime : sand
Plaster, interior of <i>māna</i> , Konārak, thirteenth century	3·14	35·89 ¹	3·00	30·72	·16	Nil	·38	·51	25·70	99·50	CaCO ₃ = 54·68 MgCO = ·33 55·01 = 4 : 3 Lime : sand
Plaster, Nālandā, site no. 3	2·24	27·52 ¹	7·84	33·95	1·13	...	·27	...	25·84	98·79	CaCO ₃ = 60·10 MgCO ₃ = 2·37 62·47 = 2 : 1 Lime : sand
Another plaster from Nālandā	2·16	23·41 ¹	5·54	34·78	1·30	...	·40	NaCl 2·40	30·30	100·29	CaCO ₃ = 61·58 MgCO ₃ = 2·72 64·30 = 2 : 1 Lime : sand
Lime-mortar, ² Egyptian, Roman period	...	29·10	4·00	34·7	2·1	...	·9	...	29·2	100·00	CaCO ₃ = 61·77 MgCO ₃ = 4·41 66·18 = 2 : 1 Lime : sand

¹ The portion of the sample insoluble in 3% HCl shows clear particles of sand and clay under microscope and has therefore been accounted for as sand and clay in the analyses. It represents the sand intentionally added to lime to form plaster.

² A. Lucas, *Ancient Egyptian Mortars*, p. 10.

TABLE II

Locality and specimen	CaSO ₄ (hydrated)	Clay and sand	Ca CO ₃	MgCO ₃	Fe ₂ O ₃	Alkaline salts	Moisture	Undetermined	Total	Remarks
White-wash, Ancient Egyptian, from the 'Cache of Akhanaten, XVIIIth Dynasty'	1·5	11·0	87·5	...	...	...	...	...	100·0	
Gypsum-plaster, Ancient Egyptian (from tomb of Tutankhamun) ¹	78·2	10·8	11·0	...	...	...	...	...	100·0	
Gypsum-mortar, Ancient Egyptian (from the Sphinx) ¹	66·9	25·5	Tr.	·8	2·0	...	...	4·8	100·0	Lime : sand = 2 : 1
Mortar, Mohenjo-daro wall (HR-site), third millennium B.C. ²	74·12	20·41	2·50	...	...	1·18	1·79	...	100·0	Lime : sand = 4 : 1
Mortar, Mohenjodaro vat (HR-site), third millennium B.C. ²	Nil	21·71	69·58	...	...	5·44	3·27	...	100·0	Lime : sand = 3 : 1
Pointing of circular platform, P ₆ Harappā, Trench V, Mound F, third millennium B.C. ³	56·90	42·16	·94	Nil	...	...	Nil	...	100·0	Lime : sand = 4 : 3
Lump, Harappā, Mound F, third millennium B.C. ³	Nil	34·85	56·01	4·81	...	...	4·33	...	100·0	Lime : sand = 2 : 1

¹ Lucas, *op. cit.*² J. Marshall, *Mohenjo-daro and the Indus Civilization* (London, 1931), II, p. 689.³ M. S. Vats, *Excavations at Harappā* (Delhi, 1940), I, p. 469.

TECHNICAL NOTES

Thus it is seen from the above tables that the Bhuvaneswar, Konārak and Nālandā samples do not contain gypsum (hydrated CaSO_4) but are composed of lime and sand in different proportions, depending upon the nature of plaster or mortar required, while free use of it was made in Mohenjo-daro, Harappā and Egypt.

SUMMARY

This work was undertaken to investigate the nature of extraneous coatings on some of the important temples of Bhuvaneswar and Konārak in Orissa and to afford a comparison of the results obtained with similar materials from Nālandā, Mohenjo-daro, Harappā and Egypt. The results of investigations are as follows :—

1. The red paint on the temples does not consist of organic matter but seems to be a simple mixture of local haematite and clay mixed to give the desired tint. The use of organic compound for red paint as suggested by Ganguli is therefore out of question.

2. The sculptures of Paraśurāmeśvara and Mukteśvara temples at Bhuvaneswar and of the Konārak temple were lime-washed at different intervals of time, and those of Liṅgarāja coated with fine plaster consisting of 3 parts of lime and 1 part of sand.

3. The inside of the *vimāna* of the Konārak temple was plastered with a coarse plaster consisting of 4 parts of lime and 3 parts of sand.

4. There is absence of gypsum in the plaster samples from Bhuvaneswar, Konārak and Nālandā, quite unlike the much older plasters and mortars of Mohenjo-daro, Harappā and Egypt.

I thank Dr. B. B. Lal, Archaeological Chemist in India for the encouragement I got from him in this work.

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